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VOLUME 8 NUMBER 5

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VOLUME 8 NOVEMBER, 1928 NUMBER 5

THE FORMATION AND HISTOLOGIC STRUCTURE OF CYSTS OF THE MAXILLARY SINUS*

G. W. McGREGOR, M.B.

Junior Assistant Surgeon, Otolaryngology Service, Toronto General Hospital, and Junior Demonstrator, Department of Otolaryngology, University of Toronto

TORONTO

The great frequency with which Dr. MacMillan, roentgenologist of the Massachusetts Eye and Ear Infirmary, is able to demonstrate the presence of cysts in the maxillary sinus by x-ray examination aroused my curiosity and caused me to undertake an investigation into their formation and structure from a pathologic standpoint. This work was carried out in Dr. Mosher's laboratory at the Harvard Medical School. I had access to all the specimens at the Massachusetts Eye and Ear Infirmary and to Dr. Kazanjian's private collection of dental cysts.

In this paper, it is my purpose to deal only with the common types of cysts, namely, secreting cysts, dental cysts of inflammatory origin and mesothelial cysts, omitting the dentigerous types which are rather rare and which are concerned with maldevelopment of the tooth follicle, and also those belonging to the group of cystic adamantinoma. The latter are essentially new growths rather than cysts.

SECRETING CYSTS

The common idea that secreting cysts are mechanically produced by obstruction alone is not a sufficient explanation. There are other factors at work, the chief one being a failure on the part of the cilia properly to fulfil their function. The excretory ducts of the glands are often long and convoluted, and are lined by ciliated epithelium deep down from the surface. These cilia must be active, for on them depends to a great extent the movement of the thick mucous secretion, which has a high viscosity, along the narrow channel of the tubule. When the cilia fail in their duty, trouble begins. With every attack of acute coryza, the mucous membrane is infected and bathed in toxins, and under this handicap the cilia are called on to carry off many times the normal quantity of glandular secretions. Is it surprising that they sometimes

* Submitted for publication, Aug. 21, 1928.

* This work was done in the Department of Laryngology of the Harvard Medical School.

fail to do their work and allow the secretions to pile up behind, causing an increase in intraglandular pressure, and thus adding a further burden on function? The gland cells continue to secrete until the pressure within equals the pressure exerted by the forces controlling the glandular secretion. This pressure is by no means small, as it has been found in the case of the submaxillary gland of the dog to rise considerably above the pressure in the arteries.

The pressure within the gland system is controlled to a great extent by the firmness of the surrounding structures. It is obvious that it would be easier for cysts to begin and also to enlarge in a loose edema-

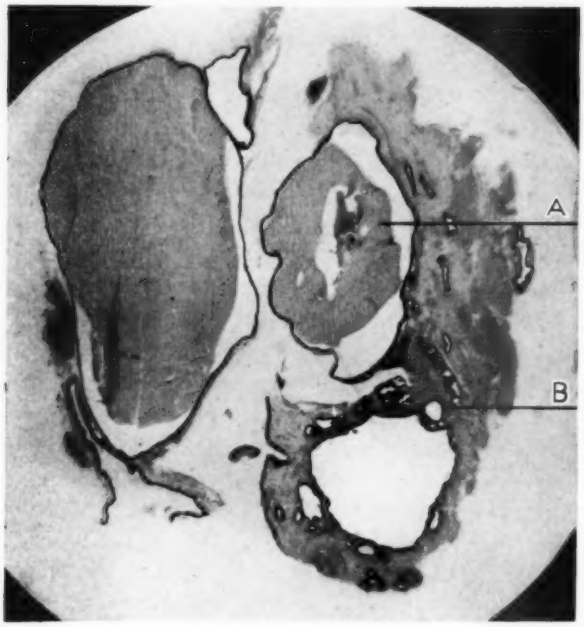

Fig. 1.—Secreting cyst, showing early formation and variation in size. *A* indicates a large cyst; *B*, a beginning cyst.

tous mucous membrane. This is a possible reason why they are generally found in this type of membrane and rather rarely in the firm fibrous type or even in the type which shows the pronounced perivascular fibrosis. Ease of distensibility of surrounding structures is an important factor in cyst formation.

There may be various degrees of distention with equal pressure appearing even in the same microscopic section (fig. 1), but it is natural that the pressure soon comes to have a deleterious effect on the epithelial lining, which makes itself evident by a stretching and thinning until the cells become thin and elongated like fibrous tissue cells instead of being tall and columnar (figs. 2 and 5). This may continue until the cilia are

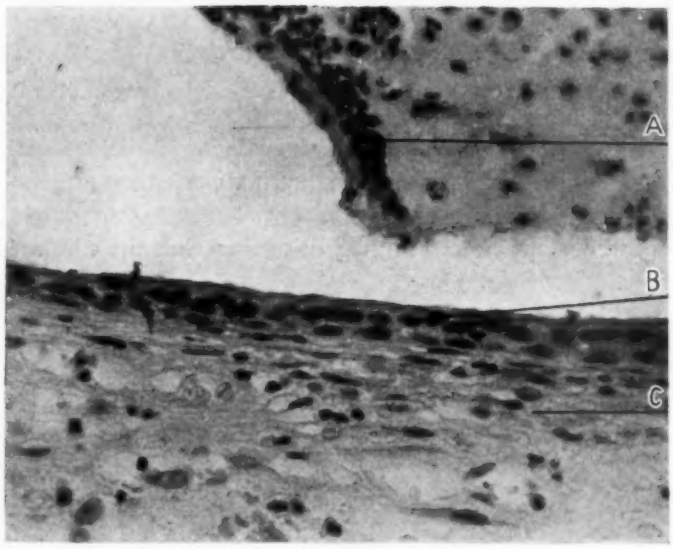

Fig. 2.—Secreting cyst showing the epithelial lining stretched so that the epithelial cells have become elongated. Note the complete absence of cilia and the marked infiltration of the cyst contents with polymorphonuclear neutrophils. *A* indicates polymorphonuclear neutrophils in cyst contents; *B*, elongated epithelial cell, and *C*, the wall of the cyst.

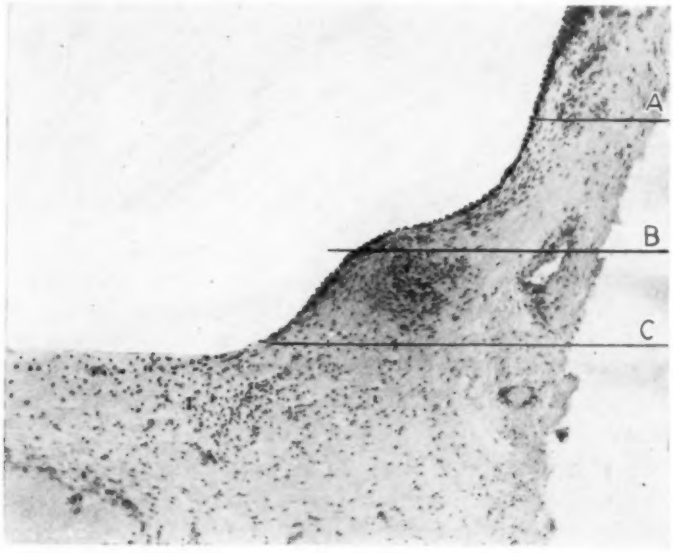

Fig. 3.—Secreting cyst, showing epithelial lining markedly damaged and completely destroyed. *A* indicates damaged epithelium; *B*, the lumen of the cyst, and *C*, the epithelium destroyed beyond this point.

completely destroyed and the epithelium entirely lost (fig. 3). One may occasionally see a cyst which, on casual observation, does not appear to have a lining, and one wonders how it was formed. Careful search, however, usually reveals small groups of remaining epithelial cells which still retain their staining powers, and the explanation is then evident. When the surrounding tissues are not firm, a cyst may become large without much apparent damage to its lining epithelium, but the cilia are usually markedly affected (fig. 4).

Repeated infection with its resultant edema, cellular infiltration and increase in connective tissue may interfere more or less with the outflow of the secretions, but I have never yet seen an actual blockage by this means.

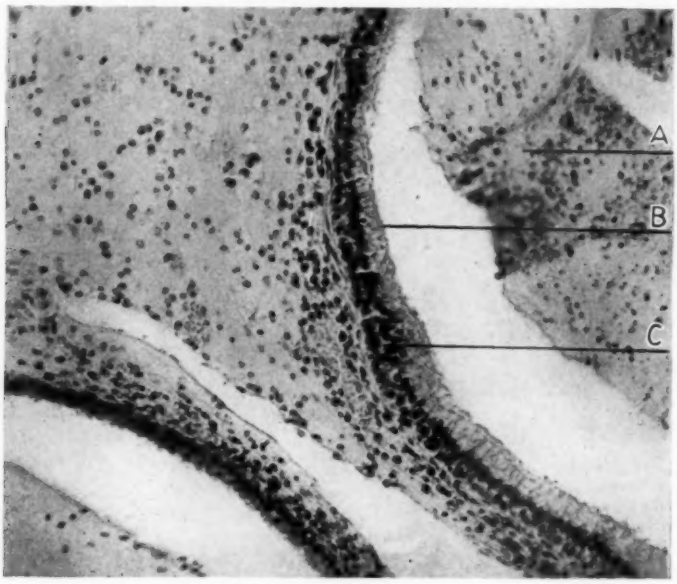

Fig. 4.—Secreting cyst lined by tall columnar epithelium with damaged cilia. The contents show many polymorphonuclear neutrophils. *A* indicates the contents of the cyst; *B*, the damaged cilia, and *C*, the epithelial lining.

On the other hand, one frequently sees tremendous infiltration and fibrosis about areas in which there is marked dilatation instead of obstruction.

Once a cyst forms, it is likely to make its influence felt by pressure on nearby glands and so favor formation of other cysts. Enlargement of a cyst also produces pressure on the lymph spaces which lie just outside the basement membrane of the secreting structure, and so hinders or obstructs the flow of lymph in this area and further reduces the chances that the mucous membrane will overcome the infection and return to a normal state.

DENTAL CYSTS OF INFLAMMATORY ORIGIN

The explanation of the formation of dental cysts by the coalescence of lumina in granuloma about the roots of teeth does not seem to me to be a satisfactory one. At some point, these cysts invariably show evidence of an epithelial lining either in good condition or partially destroyed. It does not seem logical that an epithelium without a given parent area to proliferate from would attempt to line a cavity the walls of which are merely a mass of inflammatory tissue and are already being broken down by infection. There is, however, an evident explanation on an embryologic basis plus an additional pathologic factor.

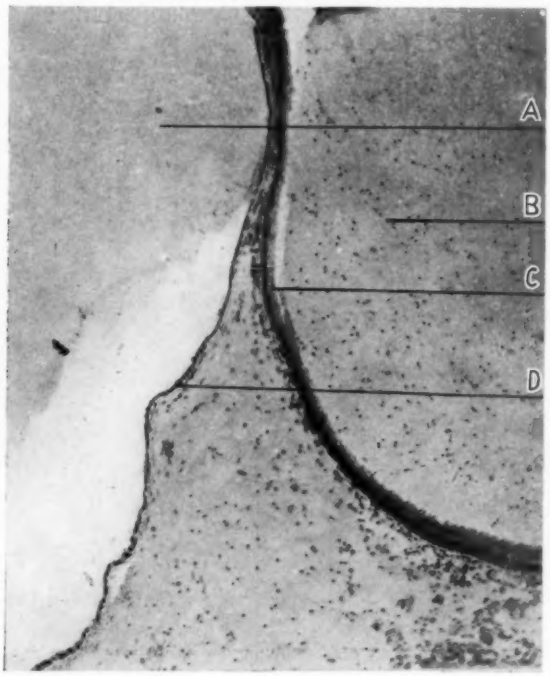

Fig. 5.—Two secreting cysts side by side. One has many polymorphonuclear neutrophils in the contents while the other has none. *A* indicates the contents of the cyst with no polymorphonuclear neutrophils; *B*, the contents of the cyst with many polymorphonuclear neutrophils; *C*, the lining of the columnar epithelium and *D*, the epithelial lining stretched and very thin.

About the beginning of the second week of fetal life, a ridgelike thickening of ectoblastic epithelium appears along the margins of the oral cavity parallel with and immediately medial to the labial grooves. They are the dental ridges, and it is from these that the milk teeth and the permanent teeth develop. From the deeper surface of these dental ridges a series of papillae project more deeply into the mesenchymal

tissue, and as they proceed in their development into enamel-organs for the milk teeth, they gradually separate from the dental ridge. At first the enamel-organs are connected with the dental ridge by a broad band of epithelial cells, but this becomes thinner and thinner and finally breaks (fig. 6). Also the dental ridges themselves begin to degenerate and become converted into a network of epithelial trabeculae, except along the lingual border where they persist as a continuous cord. From this cord the permanent teeth arise by the outgrowth of a second series of papillae, and as these papillae develop, they separate from the cord just as the milk teeth did. The cord, too, begins to undergo degeneration, and this with the other remains of the dental ridges and with the remains of the connecting strands of the two sets of papillae should completely disappear.

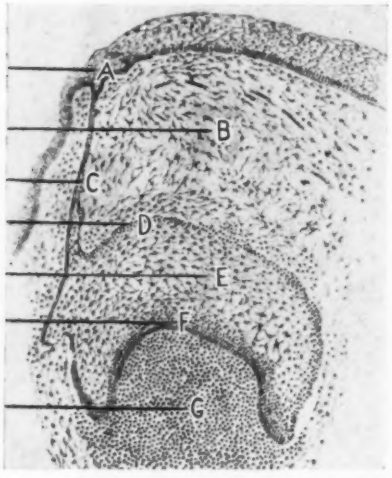

Figure 6

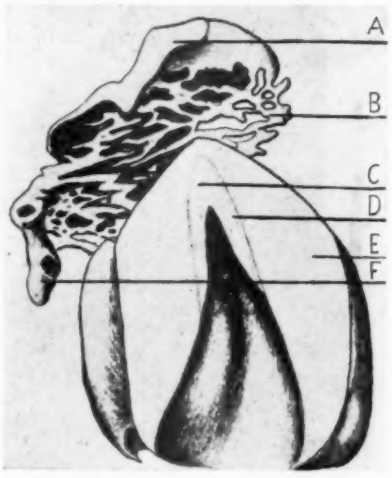

Figure 7

Fig. 6.—Early stage of tooth development showing the enamel-organ still connected with the oral epithelium (after Piersol). *A* indicates the oral epithelium; *B*, the mesoblastic tissue; *C*, the connecting strand of epithelium; *D*, the outer layer; *E*, the middle layer; *F*, the inner layer of the enamel-organ and *G*, the dental papilla.

Fig. 7.—Reconstruction of the dental ridge and a papilla of an embryo of 30 cm. (from Keibel and Mall, after Rose). *A* indicates the oral mucous membrane; *B*, the epithelial trabeculae; *C*, dentine; *D*, enamel 1; *E*, enamel pulp, and *F*, cordlike remnant of dental ridge.

This is not always the case, however, for fragments of these structures remain and persist into adult life as epithelial rests embedded in the surrounding mesenchymal tissue and are ready to proliferate again when the proper stimulus is applied (fig. 7).

The stimulus comes in the form of inflamed and carious teeth with which these cysts are associated. The cells of these epithelial rests have

all the potentialities of epithelium, so that on stimulation they proliferate and grow into the tissues. Some of the cells form a pavement-like epithelium with or without the usual papillae, while others form a columnar type with or without secreting cells, such as gland or goblet cells (fig. 8). The outer cells of the mass continue to multiply and push the inner cells toward the center where there is less nourishment for them, and soon there is a central core of dead and dying cells. Also, the outer layers of cells must keep on proliferating circumferentially in order to surround the gradually enlarging central mass, as nature abhors a break in continuity. From this beginning, it is not far to the stage where the completely formed cyst is seen with its fibrous tissue coat and more or less complete epithelial lining. It also explains those cases in which the

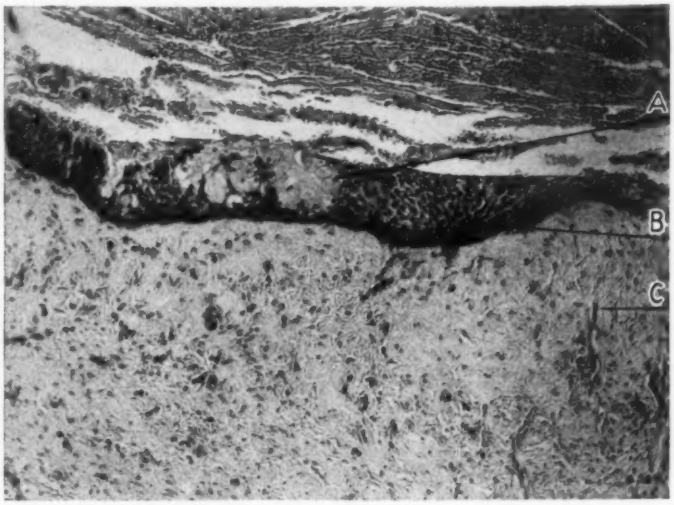

Fig. 8.—Wall of dental cyst, showing goblet cells in the epithelial lining. *A* indicates the globlet cells; *B*, the stratified epithelium, and *C*, the fibrous tissues.

cyst is found to have been formed at some distance from the tooth itself. If the lining epithelium is chiefly columnar with many goblet cells, the contents of the cyst are likely to be fluid; whereas, if the lining is chiefly of the stratified squamous type the contents are likely to be inspissated and caseous from the continuous desquamation of epithelial cells which are thus trapped within a closed cavity. This also accounts for the high cholesterol content of the latter.

These dental cysts continue to enlarge slowly, and may even reach the size of a hen's egg. They frequently invade the maxillary sinus and so become confused with disease in the antrum. Sooner or later they become infected, and when a microscopic section is examined, they present a wall of dense fibrous tissue from 0.5 to 1 mm. in thickness,

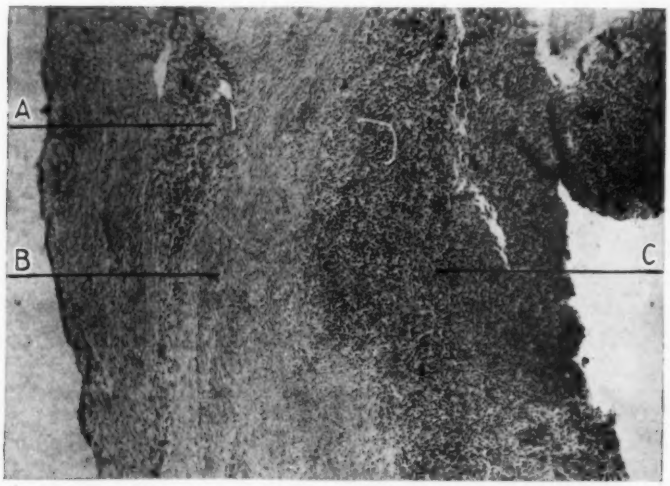

Fig. 9.—Wall of dental cyst with epithelial lining completely destroyed in this area. The inner half is a thick layer of plasma cells. *A* indicates the plasma cells infiltrating the wall; *B*, the fibrous tissue and *C*, the layer of plasma cells.

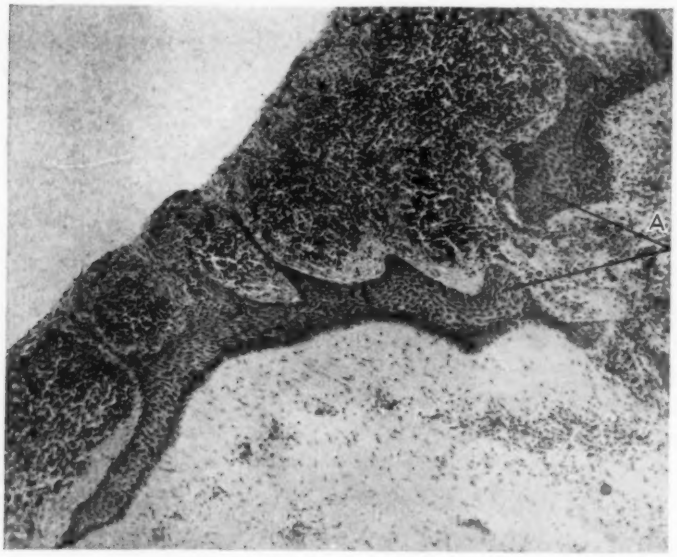

Fig. 10.—Epithelial elements in wall of dental cyst. *A* indicates the epithelial elements.

which is more or less infiltrated with inflammatory cells (fig. 9). Usually the great majority of these cells are large plasma cells with an eccentrically placed clock-faced nucleus. Among these are scattered a few lymphocytes and polymorphonuclear neutrophils. The epithelial lining is composed for the most part of stratified squamous cells with or without papillae, but here and there are areas of columnar and goblet cells. In some areas it appears as if there might have been a metaplasia from

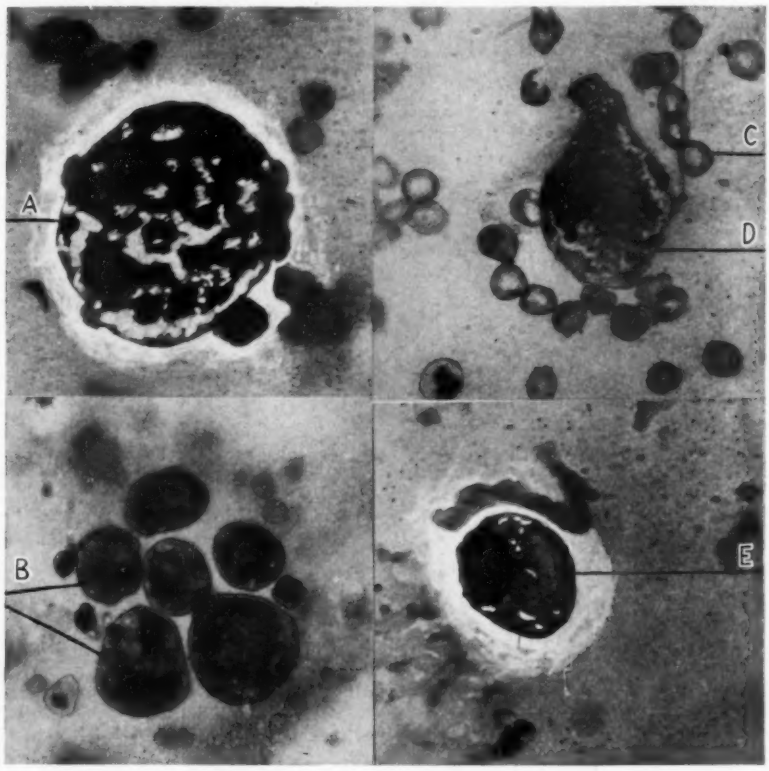

Fig. 11.—Clasmatocytes in contents of dental cysts. Note the size as compared to a red blood cell. *A* indicates a very large cell filled with ingested material; *B*, small cells well filled; *C*, a red blood cell; *D*, a large cell with contents partly digested and *E*, a moderate sized cell with large oval nucleus.

columnar to stratified squamous epithelium. Sometimes little of this lining is left, and the inner third of the wall is made up of a solid mass of plasma cells (fig. 9). Not uncommonly, masses of epithelium are found growing in the wall itself, serving no useful purpose, and apparently arising from the embryonic cell nests which are remnants of the dental ridges seen in fetal life, and which have been described previously (fig. 10).

The contents of dental cysts vary from fluid to a more or less solid caseous mass and so far have not shown organisms in direct smears or cultures on ordinary laboratory mediums. I have, however, succeeded in demonstrating by Hasting's stain an interesting type of cell in considerable numbers in the contents (fig. 11).

These cells resemble closely those recently described by Lewis and known as clasmatocytes. By the hanging drop method, he was able to show that these clasmatocytes were similar in appearance to the epithelioid cells of tuberculous lesions. He was able to follow the transformation of clasmatocytes into epithelioid cells and of epithelioid cells into clasmatocytes. He also showed that they are derived from the mono-

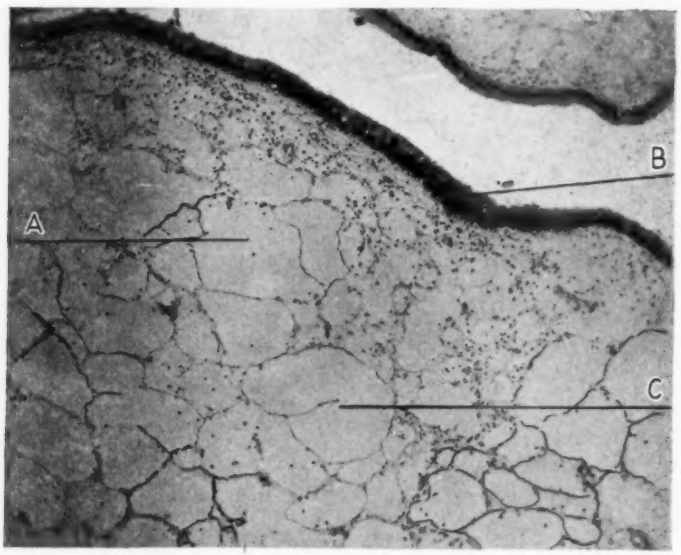

Fig. 12.—Precystic stage of mesothelial cyst formation, showing tissue spaces greatly dilated. Some of their walls are beginning to break down. *A* indicates a large tissue space; *B*, epithelial layer of the edematous mucous membrane, and *C*, two tissue spaces converted into one.

cytes. This brings up the question of a tuberculous factor associated with these dental cysts, which are sterile on ordinary culture mediums.

These clasmatocytes are extremely large; they are round, oval or ameboid and have tremendous phagocytic powers. Indeed, they are so phagocytic that they ingest dead and dying leukocytes and red blood cells till they are packed with them and have a diameter six or seven times that of a red blood cell. Some of this ingested material is partly digested, and often the nucleus is completely obscured. In other cells little digestion has taken place, and the distinguishing features of the ingested cells can readily be made out. The latter are likely to be

vacuolated, and show many coarse basic-staining granules and a large blue-staining irregularly shaped nucleus. Clasmatocytes are apparently expert scavengers, but they may have other functions which are unknown. The blood does not show any increase in monocytes.

MESOTHELIAL CYSTS

The most interesting type of cyst and the one which has the most complicated formation is that type which not uncommonly occurs in the antrum and which Finck has referred to as mesothelial cyst.

It occurs in mucous membranes where, from infective or vasomotor changes, the connective tissue stroma underlying the epithelium and derived from mesoderm becomes tremendously edematous with distention

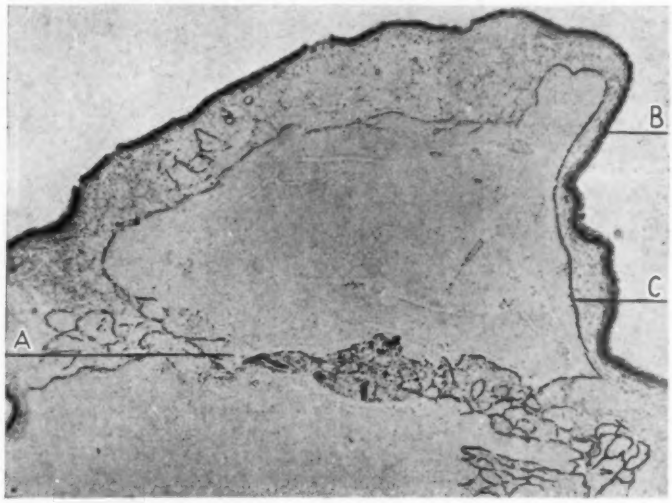

Fig. 13.—Two small mesothelial cysts being formed into one. *A* indicates the intercystic wall breaking down; *B*, the epithelial layer of the mucous membrane and *C*, the wall of the cyst.

of the tissue spaces by the accumulation of tissue fluids within them. The microscope shows great variation in the size of the spaces. In some areas, one can make out that the fibers are barely separated, while in others the accumulation of tissue fluid has become so great that huge spaces have been formed and are separated only by extremely thin strands of connective tissue. In places some strands have been unable to withstand the strain, they have been broken and left stranded and helpless, projecting out into tissue spaces. Some portions of these strands are separated from their nuclei, and this separation, together with an impoverished blood supply and the action of the surrounding toxins, leads to their death. They are left in this state to undergo degen-

eration and disintegration and thus add a further load to an already overburdened mucous membrane. This is the precystic stage (fig. 12).

Some of the spaces contain a large number of inflammatory cells, such as lymphocytes, plasma cells, eosinophils or an occasional polymorphonuclear neutrophil. These are also scattered through any connective tissue that still retains something of its original form. The areas which show the least edema are subepithelial and close to the periosteum.

As the accumulation of fluid increases, more and more connecting strands of tissue are broken, allowing several spaces to coalesce into one

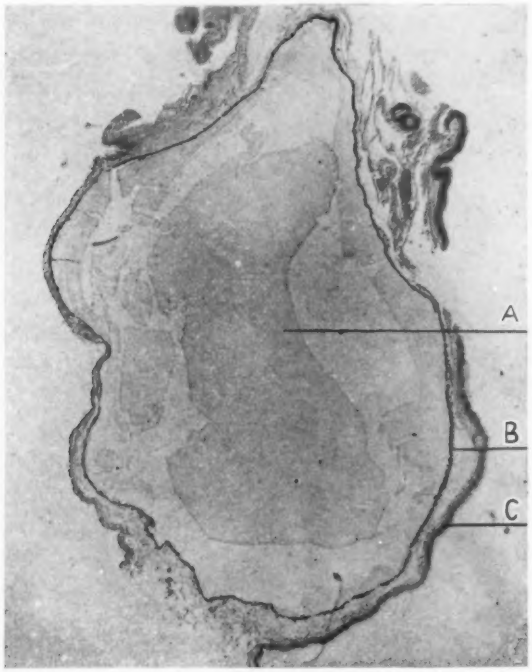

Fig. 14.—Large mesothelial cyst. *A* indicates the lumen of the cyst; *B*, the wall of the cyst, and *C* the epithelial layer of the mucous membrane.

large space which has become practically a cyst and which continues to enlarge until the forces at work are neutralized. They may even become so large as practically to fill an antrum, and when the surrounding tissue shrinks, the size of the cyst is accentuated (fig. 13).

As the cyst enlarges, the tendency is for the fibers of connective tissue in the contiguous area to be pushed closer together, so that there comes a time when the cyst appears to have a definite wall in which are one or more layers of elongated connective tissue nuclei. This may mislead one into believing that the cyst has a truly formed wall (figs. 14 and 15).

Mucous membrane which has become tough and fibrous is not so much subject to this edema, and hence it is unusual to find these cysts in this type of membrane.

When the surface of these cysts are pricked at operation, a thin, clear or yellowish fluid comes from them, and they collapse. Antrums containing this type transilluminate better than normal, whereas true secreting cysts are opaque because of the mucus they contain. Both are opaque to the x-ray.

The accumulation of fluid in the tissue spaces is the result of a disturbance of the equilibrium in the water-balancing mechanisms of the

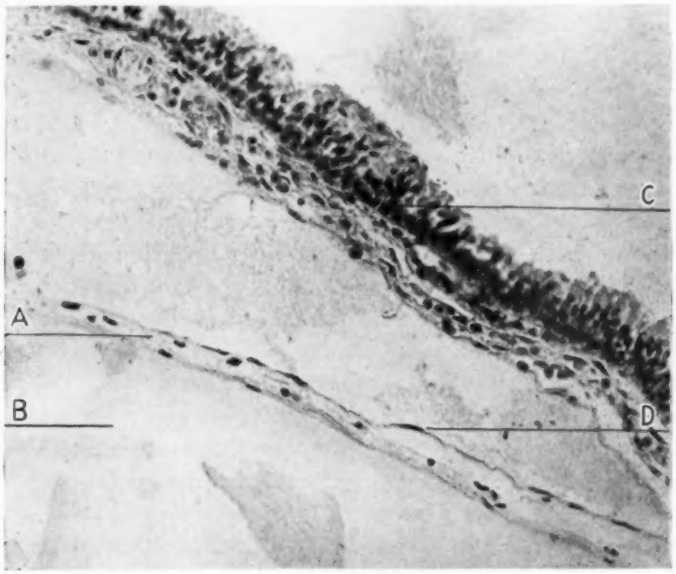

Fig. 15.—High power view of the wall of the mesothelial cyst. The wall consists only of a few strands of connective tissue. *A* indicates the wall of the cyst; *B*, the lumen of the cyst; *C*, the epithelium and *D*, the nucleus of a connective tissue cell.

tissues. The plasma of the blood and of the tissue fluids has about the same salt concentration and protein content, so that the osmotic pressure is about equal. Osmotic pressure depends solely on the number of molecules present and not on their size. Infection and anaphylactic toxins damage capillary walls, increasing their permeability and allowing proteins to pass through into the tissues. This increase of protein in the tissues increases the number of molecules present, thereby raising the osmotic pressure, and water is attracted in until a balance is again established. Also, wandering cells migrate into the tissue spaces in response to inflammation and break down. The molecules of protein thus liber-

ated again add to the already increased osmotic pressure. The water is held in this manner a long time, for these substances disappear slowly, being either oxidized or carried away by phagocytic cells; not until then is the water allowed to return to the lymphatics and capillaries.

Another factor in the disturbance of the water balance is due to the accumulation of toxins which so changes the permeability of the tissues or so brings about alterations in surface tension that water is attracted into the spaces. The consequent swelling hinders proper drainage by interfering with the function of the lymphatics, and a vicious circle is established.

McCallum has shown that the lymphatics and the tissue spaces are two closed and completely separate systems, so that the only means of communication are by pressure, diffusion and osmosis. Mucous membrane has no muscle activity, such as the limbs of the body have, to aid in the return of accumulated tissue fluids.

During activity of glands, tissue fluids are formed in considerable amounts. Barcroft showed that the submaxillary gland during activity under artificial stimulation forms in ten minutes a volume of lymph equal to the volume of the gland itself. An irritant such as an infection produces tremendous activity of the glands of the mucous membrane. This in turn greatly increases the production of lymph, thus throwing an added burden on an already damaged lymph drainage system and adding another factor to the causation of the edema.

It is a curious fact that one frequently sees two cysts side by side, the contents of one acellular while those of the other contain a great number of inflammatory cells nearly all of which are polymorphonuclear neutrophils, even when relatively few of the latter are to be found in the surrounding tissues. Why should the polymorphonuclear neutrophils be attracted into some cysts and not into others, while the lymphocytes and plasma cells are left behind? The simplest and most logical explanation is that some of these cysts become infected. A similar collection of polymorphonuclear neutrophils in another tissue would be considered an abscess. This makes them virtually pus sacs, and at operation they have been found to be filled with pus (figs. 2, 4 and 5).

Body tissues do not tolerate foreign bodies if they can help it. Those cysts that do not show the active infiltration with leukocytes are stagnant pools, and as such are in reality foreign bodies. It is not known what toxins may be secretly elaborated within their walls and liberated to work their deadly charms either locally or in distant organs of the body.

Cysts occur only in the presence of a pathologic process, so that when they are discovered by x-ray examination, as frequently happens, they should be viewed with grave suspicion even if local symptoms are absent, especially if a search is being made for a focus of infection.

CONCLUSIONS

1. Secreting dental and mesothelial cysts commonly occur in the maxillary sinus and are frequently seen on x-ray examination.

2. They may be single or multiple and may vary greatly in size, sometimes nearly filling the antrum.

3. They are all infectious in origin and occur only in the presence of a pathologic process.

4. Damage to the cilia of the gland tubules by infection is the primary cause of secreting cysts. Edema, infiltration and fibrosis may be contributing factors.

5. The lining epithelium of secreting cysts undergoes various pathologic changes.

6. Dental cysts arise from epithelial rests which remain after the development of the teeth and which become stimulated into activity by infection.

7. Dental cysts may contain large cells known as clasmatocytes, which are derived from monocytes, and which have great phagocytic powers. Possibly a tuberculous factor may be present.

8. Mesothelial cysts occur in edematous mucous membrane and are due to the accumulation of tissue fluids in the tissue spaces. They have not a truly formed wall. The edema is due to a disturbance in the water-balancing mechanism, caused by infection.

9. Mesothelial cysts are filled with tissue fluids, while secreting cysts are filled with mucus.

10. Any one of these cysts may harbor infection and may act as a focus of infection.

MASSIVE ATELECTASIS OF THE LUNG FOLLOWING BRONCHOSCOPY *

J. V. CASSADY, M.D.
SOUTH BEND, IND.

In massive atelectasis of the lung, the lumen of the bronchus is usually filled with a plug of mucus. Following removal of the secretion from the lumen by bronchoscopic aspiration, there is a beginning aeration of the collapsed lung. A foreign body completely occluding the bronchus or any complete obstruction to the bronchus produces a massive atelectasis below it. A localized edema from trauma could be considered as one of the causes of massive atelectasis. The trauma caused by pressure against the bifurcation of the bronchi by a bronchoscope could produce such an edema, or pressure against extrabronchial suppurating glands might rupture them. The case that I will report is one of a massive atelectasis of the lung following bronchoscopy.

REPORT OF A CASE

A man, aged 38, when first seen by the physician on Feb. 10, 1927, complained of cough and asthma. The cough, he said, had developed seven years previously, when his daughter had whooping cough. At that time, he developed a similar cough, which had become progressively worse with asthma and bronchorrhea. He had tried a change of climate—going to Arizona, Colorado and the Pacific Coast—but without obtaining relief. For several years, the patient had been using 3 ounces (100 Gm.) of epinephrine a week, with partial relief.

Physical examination showed a thin, sallow young man weighing about 95 pounds (43 Kg.), coughing in paroxysms, and with an asthma-like wheeze. The nose showed purulent pansinusitis. Roentgen-ray examination of the lungs disclosed peribronchial calcified glands on both sides, more marked on the left. The bases of both lungs revealed bronchiectasis, more marked in the right. The apexes of both lungs were clear. A bronchoscopic examination showed the larynx, trachea and bronchi normal except for a large amount of thick, white mucoid material in the lumen, more marked in the right main bronchus. On aspiration, the secretion was seen welling up from the terminal bronchi below.

Until Aug. 23, 1927, attention was given to the sinuses, with marked improvement as regards the cough and asthma. In October, 1927, there was a recurrence of the symptoms. Between Oct. 21, 1927, and March 15, 1928, weekly bronchoscopic aspiration partially relieved the symptoms. For four or five days following bronchoscopy, the cough and asthma were relieved, and it was not necessary for the patient to use much epinephrine. During this period, a roentgenogram (fig. 1) of the chest following the use of iodized oil 40 per cent through the bronchoscope showed bronchiectatic grapelike clusters. On March 15, 1928, the right bronchus seemed to be much improved; the left bronchus contained considerable secretion. Bronchoscopic aspiration was done with the minimal trauma, without bleeding and without anesthesia. He remained in the office as usual

* Submitted for publication, Aug. 30, 1928.

Fig. 1.—Lung on Feb. 22, 1927, after injection of iodized oil 40 per cent.

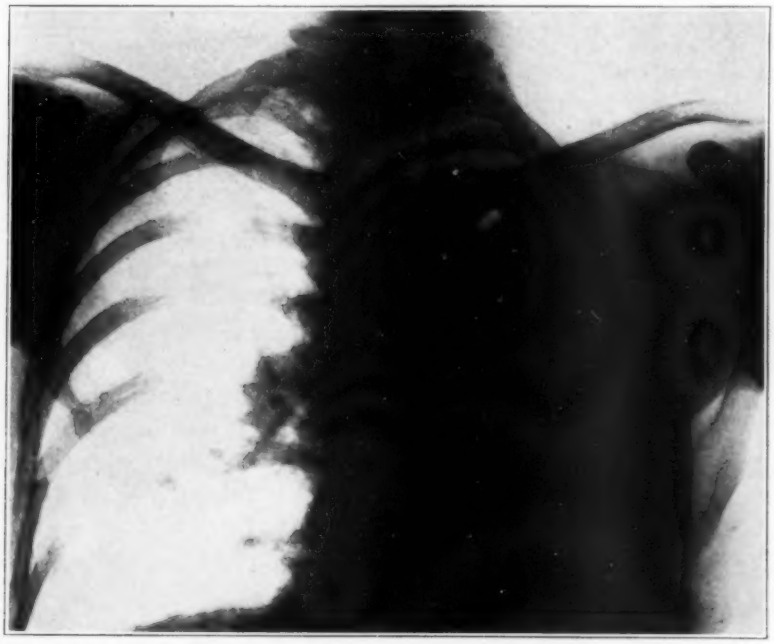

Fig. 2.—April 14, 1928, massive atelectasis of the lung, upper lobe clearing.

several hours and then went about his work. Forty-four hours later, he developed a severe pain in the left side of the chest. There was a complete absence of breath sounds in the left lung, with dulness throughout the left side. The temperature was 102.5 F. X-ray examination on March 22, 1928, showed an opaque left lung, and an especially opaque upper lobe. The diaphragm was raised and the heart displaced to the left. The latter, however, was not noted at this time. The dulness persisting, a needle was introduced to aspirate the fluid, but none was found. Three weeks later, on April 14, 1928, another roentgenogram (fig. 2) showed practically the same condition with a slight aeration in the upper lobe but with the diaphragm and the heart still displaced. On June 4, 1928, another x-ray examination showed air in the upper lobe but the lower lobe still dense, with the diaphragm raised and the heart and the trachea displaced to the left. Bronchoscopic examination on June 5, 1928, two days after the last roentgenogram, showed the lateral wall of the left bronchus beginning about an inch below the carina flattened, while the medial wall showed its normal concavity. The lumen of the bronchus was filled with thick, tenacious mucus. The lip of the bronchoscope had to press the lateral bronchus wall away to enter the left bronchus. The right bronchus was patent and did not contain exudate.

During the period of atelectasis the asthma entirely disappeared and the cough was partially relieved. The patient was comfortable, aside from feeling tired. As the atelectasis cleared up, the symptoms returned and were further aggravated by the bronchoscopic aspiration of the secretion on June 5, 1928.

SUMMARY AND CONCLUSIONS

Bronchoscopic aspiration will relieve postoperative massive atelectasis; but, as shown in this report of a case, massive atelectasis of the lung may follow bronchoscopy. The flattening of the lateral wall of the bronchus might have been due to pressure from a gland or other mediastinal pressure. On passing the bronchoscope through the collapsed lumen and aspirating the plug, the bronchus remained collapsed on withdrawal of the bronchoscope. Future therapeutic collapse of the lung was indicated by the relief of symptoms, cough and asthma, during the atelectasis.

CHRONIC SUPPURATION OF MAXILLARY SINUS INCLUDING ORAL FISTULAS*

OPERATIVE CURE

JOHN H. HARTER, M.D.
SEATTLE, WASH.

Articles on the operative treatment of chronic suppurative sinusitis are usually so padded with oft repeated historical data and so filled with axiomatic generalities that the reader is left bewildered as to what procedures the writers actually rely on. In this paper I shall not give a historical résumé. I shall not quote from authority. I shall state and attempt to defend my present convictions concerning the treatment in chronic suppurative sinusitis and relate the disappointments and failures which led to my convictions. I shall criticize this and other methods from the standpoint of the rhinologist in private practice. I shall summarize the results of my present operative procedure. For brevity, I shall use the term antrum synonymously with maxillary sinus.

An operation is not considered unless suppuration continues after a reasonable course of irrigation. The special micro-organisms present do not seem to have any bearing on healing before or after the operation.

SURGICAL ANATOMY

The maxillary sinus has the following anatomic characteristics and connections which are of surgical interest: After about the twelfth or thirteenth year of age, the antrum hollows out the entire cheek bone. It is therefore practically always constant in location and symmetrical on the two sides. The ostium is near the top of the cavity. The antral floor is usually lower than the nasal floor. Some of the teeth not infrequently project into the antral floor, being covered by a very thin plate of compact bone. The naso-antral wall in its anterior portion slopes markedly lateralward. The only large vessels encountered in surgical operation on this cavity are the posterior palatine, which are found far back in the naso-antral wall. There is a strong natural tendency toward spontaneous closure of a fistula from the maxillary sinus to the mouth. The maxillary sinus as opposed to the other sinuses does not have any dangerous vascular connections with the brain or its coverings.

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* Submitted for publication, Aug. 29, 1928.

* Read before the meeting of the Pacific Coast Oto-Ophthalmological Society, April 18-20, 1928.

CRITICISM OF THE INTRANASAL OPERATION

From many considerations, theoretical and anatomic, from the results of my own earlier endeavors and from the observed end-results of the work of other operators, I view with disfavor the intranasal operation. The cramped space of the anterior naris, the lateralward slope of the naso-antral wall and the presence of the inferior turbinate put the surgeon at a great mechanical disadvantage. Inspection of the sinus with removal of polypi and other pathologic tissue cannot be done with the same thoroughness as through a window in the canine fossa. To offset these mechanical disadvantages, a great portion of the inferior turbinate is often removed. Inspection of one of these mutilated noses brings the conviction that from the physiologic standpoint the intranasal operation should be called, not the conservative, but the radical one. The great number of recurrences of suppuration following the intranasal operation furnishes practical and conclusive evidence against this procedure.

CRITICISM OF THE LUC-CALDWELL OPERATION

In my first years of practice, I did chiefly the Luc-Caldwell operation, and had many cures. The following case reports are typical of the occasional failures and disappointments:

CASE 1.—Miss E. M., aged 19 years, who had a right suppurative maxillary sinusitis of five years' duration, was treated by Luc-Caldwell operation, in 1921, under ether anesthesia. The postoperative period proving uneventful, the patient was discharged as cured. One year later, she returned, stating that she believed that this cavity was again discharging. It was dark by transillumination, slightly tender to pressure, and there was some mucoid discharge in the right side of the nose. I attempted to pass a cannula but could not find an opening. I punctured the naso-antral wall with a trocar. The patient complained of much pain and there was a large amount of blood in the irrigation fluid. This patient never returned to my office although I knew personally her entire family. It was a disagreeable and impressive experience.

CASE 2.—Dr. L. A. D., aged 30, had a left suppurative maxillary sinusitis, of 2 years' duration, which I irrigated three times weekly for six months without benefit. I resorted to the Luc-Caldwell operation in October, 1922, ether anesthesia being used. The patient's convalescence was uneventful. He was discharged as cured after three weeks. Fourteen months later, he returned, stating that he believed this cavity had become reinfected during a recent cold in the head. The antrum was dark by transillumination, tender to pressure, with some mucopus in the nose. I attempted to pass a smooth cannula into the sinus but could not find an opening. I also assured him that this was undoubtedly an acute condition that would disappear with conservative treatment. However, he knew just enough about naso-antral windows to make him inquisitive, and he insisted that I irrigate the antrum. I attempted to do this with a trocar and a cannula, but the bone was so hardened and thickened that I was unable to puncture it. This sinus cleared up quickly under simple treatment. Nevertheless, this again was a disagreeable and humiliating experience.

These two cases typify the disappointments which led me to abandon the Luc-Caldwell operation. Another case report will be included here because it furnishes evidence against the Luc-Caldwell operation. It belongs, however, in the group of cases in which operation was done with the Denker method.

CASE 3.—Mrs. E. A. B., aged 50, had a bilateral maxillary sinus infection of about three years' standing. One year previous to coming to me, she had had a left Luc-Caldwell operation done on the sinus by one of my colleagues. I easily determined that there was purulent discharge from both maxillary sinuses. Quoting from my operative record: "The window in canine fossa made at previous operation is closed with smooth bone except a vertical slit 3 mm. wide and 9 mm. long. The cavity of the maxillary sinus is entirely filled with a mass of fairly hard bone. Within this and extending about perpendicular to the naso-antral wall are two suppurative tracts about 3 to 4 mm. in diameter and emptying into inferior meatus."

The criticism against the Luc-Caldwell operation might therefore be summarized as follows: It has a tendency to be followed by a great narrowing or a closure of the naso-antral window; by a thickening of the naso-antral wall, and by the formation of irregular suppurative tracts within the new-formed bone. A further disadvantage is the impossibility of properly eradicating disease in the anterior naso-antral angle. Failures to effect the healing of suppuration are probably due to one or all of the four factors mentioned.

TECHNIC FOR THE DENKER OPERATION WITH LOCAL ANESTHESIA

A cathartic is given the second night before the operation. One hour before the operation hyoscin-morphine no. 1 in 2 cc. 25 per cent magnesium sulphate solution is injected by hypodermic needle. If the patient is markedly underweight, this dose may be decreased. Twenty minutes before the operation, the patient is examined and is usually given another dose of hyoscin-morphine no 1 or no. 2, as deemed advisable. Arriving at the operating room, the patient should be just awake but not interested in the surroundings. Many patients are asleep during most of the operation. Sometimes they remember nothing of it. I have never had the least difficulty with the general behavior of the patient, and my series includes several who were extremely high-strung, touchy and nervous. The slightly reclining sitting posture is used. A strap is placed around the patient's waist. One per cent procaine hydrochloride and 10 per cent cocaine solutions with epinephrine are on the operating table. The cocaine solution is colored red so that a mistake cannot occur by interchange of these.

The face is cleansed with alcohol, and, except within the nose and antrum, asepsis is earnestly attempted.

The nasal cavity on the side of the operator is packed to the upper level of the inferior turbinate with gauze squeezed out from the cocaine solution.

Procaine hydrochloride is injected over the canine fossa; one keeps close to the bone, going upward to include the infra-orbital nerve. A horizontal incision is made across the canine fossa and tissues elevated above this. A small opening is made through the canine fossa into the maxillary sinus and this cavity is packed with cocaine gauze. After waiting about ten minutes for the cocaine gauze within

the antrum to act, one proceeds by removing a narrow strip of bone from the original opening into the antrum over to the sharp edge of the pyriform aperture. The interior of the antrum is then treated as indicated. Following this, the mucoperiosteum of the inferior fossa is elevated and the bony naso-antral wall removed. The mucoperiosteal flap of the inferior meatus is then cut anteriorly, above and posteriorly and turned onto the antral floor. It is packed there with 1 inch gauze saturated with 10 per cent argyrol, the free end in the nose, and is allowed to remain for four days. The cavity is irrigated twice weekly until dry.

I shall now consider the controversial point as to whether or not the lining membrane of the antrum should be removed. With the Denker operation, it must in every case be removed from the portion of the floor adjacent to the naso-antral wall, so that the mucoperiosteal flap will become adherent there. As regards the remainder of the cavity, my conviction, backed up by experience, is this: if the lining membrane is smooth and without polypi and edematous masses, it should be left in situ. The healed cavity then is similar to the normal

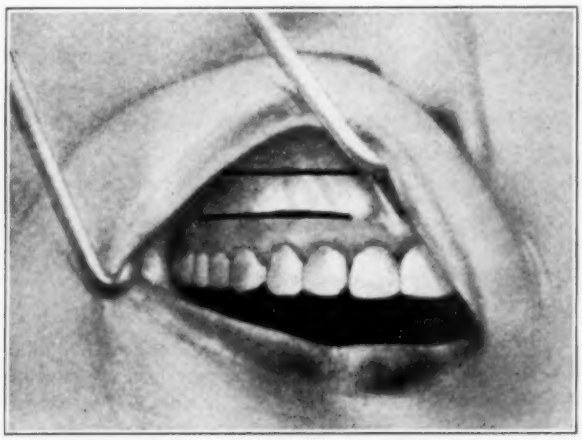

Fig. 1.—Denker's operation. The upper line gives the correct position for the initial incision.

antrum except that it has a large ostium at the lowermost portion. If the lining membrane is polypoid, edematous or necrotic, it should be entirely removed. The antral cavity then becomes largely obliterated by osseous and fibrous tissue, and is lined by stratified squamous epithelium. I firmly believe that the one who says the lining membrane should always be removed and the one who says it should never be removed are both wrong.

Special Operative Precautions.—

1. Make the incision across the canine fossa high. Several of my patients have had upper plates and all have been able to wear these afterward.

2. Make the initial opening into the antrum well lateralward and high, as otherwise one is apt to enter the nasal cavity.

3. At the anterior naso-antral angle do not remove the bone any lower than necessary as the root of the canine tooth in a small percentage of cases runs up high.

4. Complete the treatment of the antral cavity before removing any of the naso-antral wall.

5. Never remove any portion of the inferior turbinate at the time of the Denker operation. In some cases, it is necessary to remove about 1 cm. of the anterior shoulder of the turbinate. This can easily be done before, or about three weeks after the operation. If done at the time of the operation, the turbinate has lost much of its stability, and one is apt to take off more than desired.

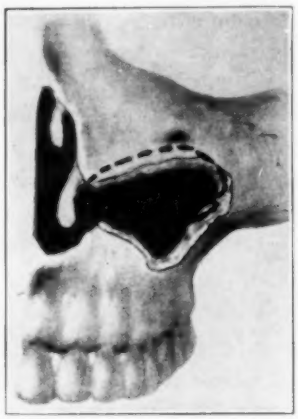

Fig. 2.—The dotted line shows the proper placement of the bony opening in the canine fossa.

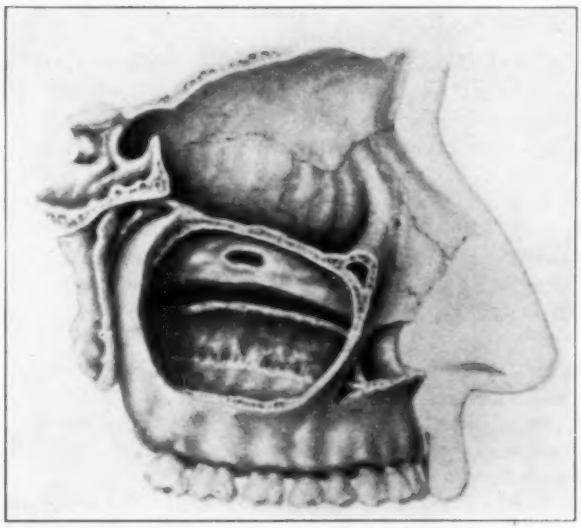

Fig. 3.—Diagrammatic illustration of using the flap from the nasal wall.

FISTULAS FROM ANTRUM TO MOUTH

In considering fistulas from the antrum to the oral cavity, the fact should be kept in mind that there is a strong natural tendency toward spontaneous healing. Therefore, such a fistula denotes: (1) a persistent

discharge within the antrum with seepage into the fistula, thus preventing healing, (2) the presence of a large bony opening in the floor of the antrum often associated with (3) epithelization of the fistulous tract.

These fistulas may be divided into three groups for treatment:

1. Small fistulas, admitting only a probe, occurring usually on the alveolar ridge. After the Denker operation has been done, these tracts should be roughened with a small burr or cotton wound applicator at intervals of about two weeks; with the cessation of the discharge from the antrum, the fistula will heal.

2. Large openings within the alveolar ridge. Make the original incision in the canine fossa so as to include the mucoperiosteum over the buccal aspect of the fistula. After completing the Denker operation, remove the buccal plate of the fistulous tract, and apply the mucoperiosteum to the freshened lingual surface of the fistula.

3. A large opening from the antrum through the hard palate. This becomes in reality a partial cleft palate and requires the same operative procedure.

REPORTS OF CASES IN WHICH THE DENKER OPERATION WAS USED

Two cases particularly show what may be expected with the Denker operation in difficult conditions:

CASE 1.—Mr. C. J. S., aged 36, had suffered a discharge from the right side of the nose for a long time. Seven years before I received him as a patient, he had had an intranasal operation on the right antrum, and five years before I saw him, a Luc-Caldwell operation on this cavity. I irrigated this antrum twice weekly for a period of six months while working up my technic on the Denker operation with local anesthesia. The return flow of pus was unusually profuse and extremely foul. During this time, diathermy treatments of the antrum were being administered by another physician. Denker's operation was done in November, 1924. The patient's sinusitis has remained completely cured. He is a singer and local radio announcer, and he and his friends have sent me many cases of sinus trouble.

CASE 2.—Mrs. I. A., aged 26, in 1920, had a series of irrigations of the left antrum. In 1923, she was referred to me by her dentist. I irrigated the left antrum several times, with a return of thick pus. Improvement did not follow. A large, intranasal window was made in the inferior meatus. After a few more irrigations, the patient's trouble was cured.

Six months later, with a cold, she had a return of the symptoms. She then went to one of my colleagues, who also irrigated the left antrum, made an intranasal window and cured the inflammation.

After about six months, with another cold, she had a return of the symptoms, but deciding that the disease was better than the attempted cure, she stayed away from physicians.

In October, 1927, four years after I had performed the intranasal operation, she again told her troubles to her dentist, and he assured her that in the meantime I had learned how to cure these conditions and prevailed on her to revisit me. Denker's operation, performed in October, 1927, resulted in a complete cure.

SUMMARY OF RESULTS IN A SERIES OF 31 CASES

From July, 1924, to the present date, I have had thirty-one patients and have performed thirty-eight Denker operations. There were two cases of ozena in which three Denker operations were performed. Not counting the cases of ozena, I have had thirty-one patients and have done thirty-seven Denker operations. The youngest patient was 19 years old; the oldest was 67 and is now 71; the average age was 37 years. Two patients had each a fistula to the mouth.

Series of 31 Patients in Whom Denker's Operation Brought About Complete Healing of Chronic Suppuration of Maxillary Sinuses

No.	Age	Sex	Side	Previous Operations	Other Conditions
1	35	F	Both	None	Edentulous
2	32	F	Right	Intranasal	
3	36	M	Right	One intranasal; one extranasal	
4	38	F	Left	Intranasal	Fistula to second molar cavity
5	67	F	Right	None	Edentulous
6	24	M	Right	None	
7	34	M	Both	None	
8	29	M	Both	Left intranasal	
9	42	F	Left	None	
10	27	M	Right	Intranasal	
11	59	F	Both	Left, Luc-Caldwell	Edentulous
12	32	F	Right	None	
13	41	F	Left	None	
14	44	F	Both	None	Edentulous
15	46	F	Left	Intranasal	
16	46	F	Both	None	Edentulous
17	47	M	Right	None	
18	34	F	Left	Intranasal	
19	33	M	Left	None	
20	57	M	Left	None	Edentulous
21	30	M	Both	None	
22	22	F	Left	None	
23	63	M	Left	None	Edentulous
24	20	M	Right	None	
25	30	F	Left	None	Fistula posterior to alveolar ridge
26	27	F	Left	Two intranasal	
27	45	M	Right	None	
28	36	F	Right	None	
29	19	M	Left	None	
30	44	M	Right	Intranasal	Edentulous
31	30	F	Left	Two intranasal	

All these patients were observed through convalescence until in each case the antrum was dry, and all but eight are still in my practice and have been seen many times. As far as I can determine, the sinus troubles of all these patients have remained entirely cured.

There was only one postoperative complication. A man, aged 47, developed subcutaneous infection of the cheek adjacent to the buccal incision. This was drained below the mandible and healed promptly without a noticeable scar.

In twelve cases teeth were absent beneath the antrum.

CRITICISM OF DENKER'S OPERATION

The usual criticisms of Denker's operation are:

1. The alleged accumulation of discharge within the antrum and its sudden dumping into the patient's lap when he lowers his head. A tendency toward this has not existed in any of my cases. I believe it will never follow a Denker operation properly performed.

2. The desensitization of the teeth. Any operation in the canine fossa will temporarily destroy the sensory nerve supply to the underlying teeth, but the anastomosing blood supply is not destroyed and therefore the teeth do not die. One has learned to think that a desensitized tooth is a dead tooth, because when a dentist kills the nerve in a tooth by filling the root canal he thereby also shuts off all blood supply to the tooth. But, as stated, this does not hold true in teeth desensitized in an operation on the antrum through the canine fossa.

3. Weakening of the bony framework of the face. In reoperating on patients who have undergone a Luc-Caldwell operation, it is noted that the bone of the canine fossa largely reforms. This criticism of weakening bony framework may also be brought against the submucous resection and against certain plastic operations on the nose. This risk must be weighed against the advantages.

4. The mechanical difficulties of the Denker operation, which is, without question, far more difficult than the intranasal or Luc-Caldwell operation. If an intranasal operation has been done previously in the inferior meatus, the mucoperiosteum is transformed into scar tissue and the making of a perfect flap may be impossible. However, I have been able even in these cases to make enough of a flap to secure a permanent opening. Local anesthesia makes this operation feasible to a nasal surgeon of ordinary skill.

CONCLUSIONS

I favor the Denker operation, with local anesthesia, for the following reasons:

1. It is reliable. The patient can be assured that unless unusual complications arise he can leave the hospital in four days and return to work in ten days, and that, after healing, the cavity will not be subject to infection any more than is the lining membrane of the nose.

2. At any time following the operation, a straight applicator or cannula can be inserted into the antrum, and irrigation will demonstrate to the patient that suppuration is not present.

3. Disease in the anterior naso-antral angle is eradicated.

4. The hemorrhage and shock of the operation are minimized.

5. The postoperative period is shortened, and painful after-treatments are avoided.

320 Stimson Building.

PROSTHETIC AIDS IN RECONSTRUCTIVE SURGERY ABOUT THE HEAD

PRESENTATION OF A NEW METHOD *

FRANCIS L. LEDERER, M.D.
Assistant Professor, Otolaryngology, University of Illinois
CHICAGO

Remarkable strides have been made in the field of plastic and cosmetic surgery in the last fifteen or twenty years. The defects brought about by modern warfare provided a large experience in reconstructive surgery. Congenital defects, and those caused by syphilis, tuberculosis and carcinoma, necessitated the development of a technic for their correction. During and since the World War, reconstructive surgery has grown to become a well known specialty, and remarkable results have been shown in rather hopeless looking cases. Plastic repair of traumatic deformities about the face was originally employed in this special field, but of late years the tendency has been to drift to the more lucrative and less laborious cosmetic field. However, I wish to consider only those cases of the true reconstructive type, namely, those in which there is a total or subtotal loss of parts.

Gillies,[1] one of the inventive geniuses in the field of reconstructive surgery, considers the repair of the syphilitic nose one of the most difficult in the whole range of plastic surgery. Syphilis, it is well known, destroys everything within its field, including membrane, cartilage, bone and skin, and leaves a hard, contracted, tenaciously adherent scar, the subsequent cicatrization leaving a disfigurement not only of the affected part, but also of the surrounding parts (fig. 15). This change in facial contour, of course, differs in proportion to the amount of destruction. Syphilitic nasal destruction is usually classified in three degrees, namely: (1) the saddle nose, in which the saddle is confined to the bridge; (2) a nose in which the tip is retracted upward or to one side, due to loss of mucous membrane as well as of the bony and cartilaginous support, and (3) destruction, partial or total, of all of the nose (lining, structure and skin).

The cosmetic reconstruction of first degree, and in most instances of second degree, syphilitic nasal deformities, has on the whole yielded satisfactorily to the variety of technics employed today. The repair of third degree syphilitic destruction of the nose has been more difficult than deformities due to other causes, because of the devitalization pro-

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* Accepted as candidate's thesis to the Chicago Laryngological Society.

1. Gillies: Surg. Gynec. Obst. **30**:121 (Feb.) 1920.

duced in the area attacked and also because of the disturbed circulation in neighboring tissue, the result of syphilitic scarring. Surgical methods of using grafts, tubal flaps and pedicle flaps in these cases has been known and employed since the time of the ancients, but many who have been engaged in this field are by no means satisfied with the results of laborious and painstaking work extending over periods of months and even years. Covering the parts with skin is an improvement over the original deformity, but the success of such endeavors is apt to be overestimated by the operator without considering the psychology of the patient, who is, after all, the one to be most considered.

In the majority of these cases, in spite of a poor surgical cosmetic result, there seemed to be a marked change in the psyche of the patients. It is inferred from this that the effect of the attempted correction gave

Fig. 1.—A group of children with congenital malformations of the ears. These children were under surgical treatment at the time.

the patient some relief from his inferiority reactions and also some hope that the disability was only temporary, and amenable to correction. Notwithstanding all this, success in reconstructive cases has been only temporary, and too often the result at the end of surgical endeavor was deformity replaced by monstrosity.

Unfortunately, skin cannot be molded in the manner of clay and therefore nature's work is approached with the greatest difficulty. As the nose is constantly under the scrutiny of others, it stands to reason that the patient would be no worse off without his nose or perhaps with a small adhesive dressing than he would be with a few clumps of grafted skin, which at its best would still be extremely conspicuous. Authors of articles dealing with such cases have profusely illustrated their work with pictures of the variety of steps and then the finished product. Since

Fig. 2.—Various types of congenitally malformed ears. Several of these patients have had attempted surgical correction, but no operative steps are shown here.

I, too, have done the same, I can now look over my records and these illustrations and wonder where I succeeded (fig. 5). I have indeed been disappointed in the net results of my painstaking endeavors and in a measure feel guilty for having subjected my patients to operations which not only entailed a great economic loss and suffering on their part, but in many instances jeopardized their health and lives. They had scars remaining where tissue was grafted, perhaps spent many an uncomfortable week in a cast (when Italian grafts were utilized), lost time from their work, and in some instances had to accept primary failure due to poor healing, etc.

With regard to the deformities of the ear, both the congenital (figs. 1, 2, 3 and 4) and the acquired (figs. 9, 10, 11 and 12 types of complete or partial absence of the auricle, this field has occupied my attention for a number of years. Careful and painstaking attention has been given a rather large group of these cases, and I found that the result of this labor has been most discouraging (fig. 8). Van Dijk [2] comments on the absence in the literature of reports of cases in which the entire auricle has been reconstructed by surgical measures. He mentions particularly the works of Nelaton and Ombredane,[3] Blair [4] and Esser as those not containing such cases. However, I have only to refer him to the work of Beck,[5] who on innumerable occasions has published cases embodying work of supplanting an entire auricle. Van Dijk therefore draws the conclusion that the loss of an entire ear seldom occurs. He also states that the aural appendage is not cosmetically essential in women, as they are able to hide their deformity completely under their hair. However, I find that regardless of sex, the desire for replacement of the parts is true in practically every instance. A few years ago Beck described clearly the need of correcting deformities because of certain vital psychologic factors, as I have already stated, which were so important to keep the person in his or her social sphere.

Van Dijk, the author of the case report that has already been mentioned, goes into great detail regarding the many steps of the operation in the reconstruction of ears, and illustrates them well. However, at the end of the series of operative procedures, he was not satisfied with the final result. He found the ear too bulky, not sufficiently erected and the fossa scaphoidea and the antihelix not built up, and he planned in his next case to get the ear more erect through implants of cartilage, giving it more of a shell-like appearance. This case is given in detail to support

2. Van Dijk, J. A.: Acta oto-laryng., part I.

3. Nelaton and Ombredane: Les Autoplasties, 1907.

4. Blair, V. P.: Surg. Gynec. Obst. **33**:261 (Sept.) 1921; **34**:701 (June) 1922.

5. Beck, Joseph: Tr. Am. Otol. Soc., 1925; Applied Pathology, St. Louis, C. V. Mosby & Company, 1923; J. Indiana State M. A. **18**:167 (May) 1925.

Fig. 3.—Same as figure 2.

my conclusions that in a large number of cases in which I had an opportunity in each instance to improve my technic, I could not shape an ear to resemble a normal ear, but replaced it by means of a bulk of misshaped tissue (figs. 5 and 8).

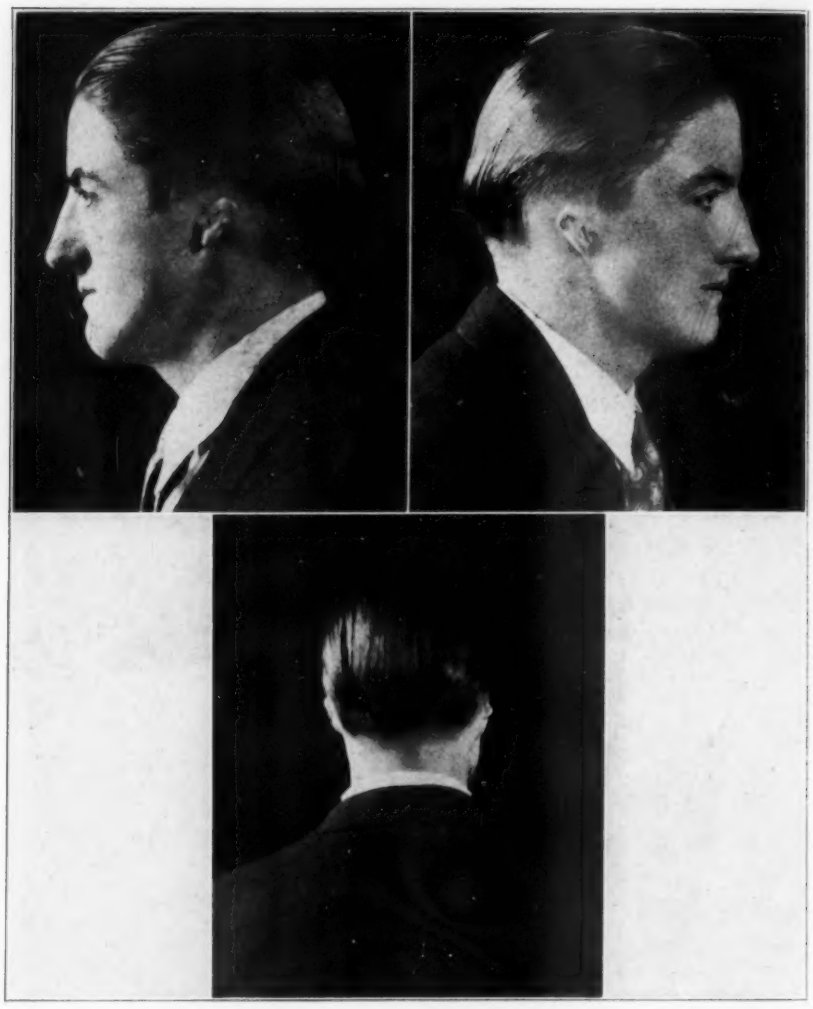

Fig. 4.—Bilateral congenital microtia in a young adult.

More and more, those who are doing this type of reconstructive surgery are beginning to realize the facts as they have been stated, and know from experience exactly how arduous the task is that they undertake in trying to build up these gross defects. It is, of course, not without some loss of pride and regret in past accomplishments that we

have come to realize the uselessness of it all and to recognize a substitute for this type of surgical procedures.

I am indeed indebted to my former associate, Dr. Joseph Beck, for having given me an impetus, as well as in a large measure for having furnished the clinical material for this work and for the splendid cooperation I have had at all times. As this paper does not cover the surgical technic employed, suffice it to say that all of the patients were under care for a sufficient number of years, during which time practically every known mode of procedure in this field was used. In addition, many original methods and technics were devised in the course of the many operations. A number of the patients who were operated on

Fig. 5.—Example of a congenital microtia corrected by innumerable surgical procedures (twenty-five in all, eighteen under synergistic analgesia), illustrating well the substitution of a monstrosity for a deformity.

innumerable times have been taken care of by the method of prosthesis, which will be described, and have been more gratifying as to results (fig. 8).

For a number of years, during which total deficiencies of the nose and ear also were corrected by surgical measures, certain physiologic, anatomic and economic factors often presented which made it absolutely necessary to use some form of prosthesis in these cases in the form either of hard rubber or of some light metal (figs. 13, 16 and 17). I found these objectionable for many reasons, viz., the cost of manufacture was high (they were of such material as was easily broken or bent and would frequently have to be made over); the color to match the neighboring skin was difficult to obtain, and if finally it did match, the color would come off; the prosthesis would in most instances have to be fastened by a heavy spectacle frame; and, lastly, but of great importance,

the replaced part always had a stiff, artificial appearance that attracted as much attention as did the original deformity.

When I went to Paris, I was struck by an observation made in a theater of international fame in which dolls of a flexible rubber material

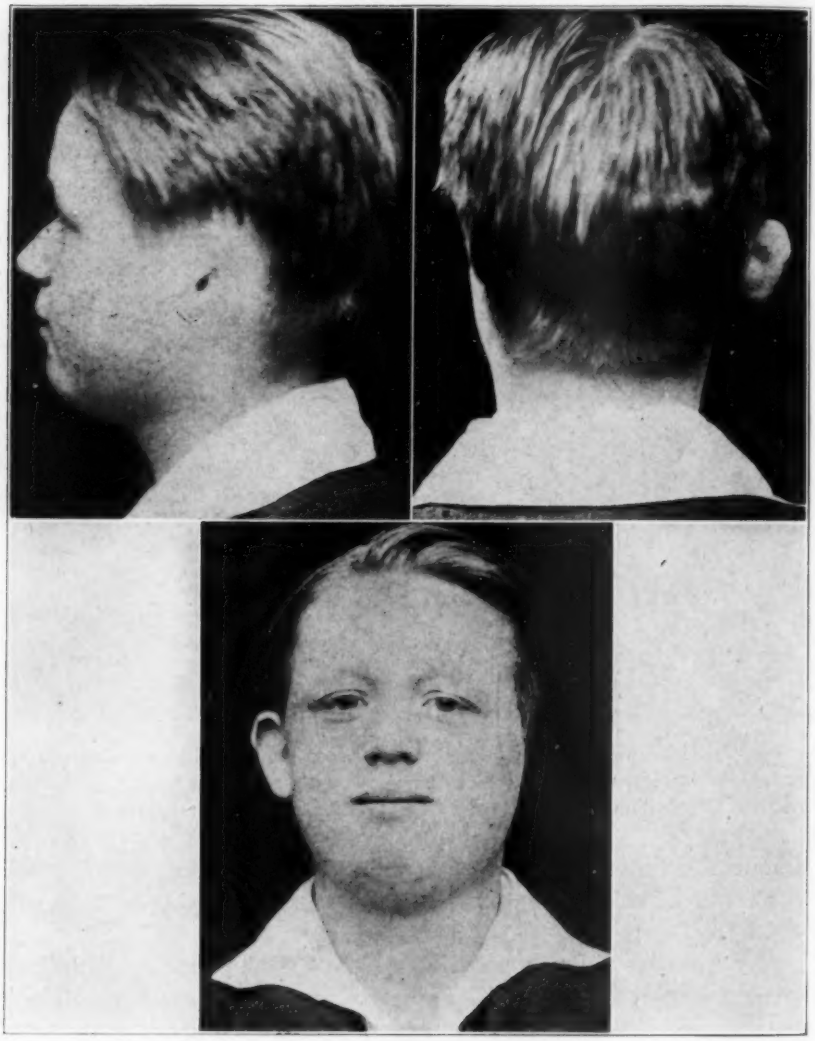

Fig. 6.—A case of congenital malformation in which the mode of prosthesis as has been described is aided by removing surgically useless remnant of the left ear. This figure shows the patient before the prosthesis has been applied. (The work on this case was carried out at the University of Berlin in conjunction with Technician Klocke.)

were being sold. It occurred to me then that the material appeared so elastic as to be invaluable in prosthesis. Much to my gratification, I found that at the University of Berlin a similar type of material was being utilized in the manufacture of face prosthesis. Credit must be

Fig. 7.—The same as figure 6 after the prosthesis has been applied.

given the late Professor Adolph Passow, who, at the suggestion of Warnekros [6] in 1913, induced his laboratory technician, Klocke,[7] to work

6. Warnekros: Deutsche. Zahnarztl. Wchnschr. March 14, 1918.
7. Klocke: Med. Klin., 1916.

Fig. 8.—Patient with a congenital microtia who after a great many surgical procedures had a bulk of skin substituted. This result, as shown, does not demonstrate the difficulties encountered nor the many sacrifices on the part of the patient. This entire mass was then covered over by the prosthesis material and the patient made happy.

out such a method of producing artificial ears and noses. The procedure has been perfected by Klocke, and I feel sure that these prostheses comply with all the demands which can be made on such substitutes. They are not expensive, are easily made and possess a desirable elasticity

Fig. 9.—Cases showing partial loss of an auricle. Such types have been caused mainly through gunshot wounds and by being bitten off by cows and horses.

and durability. I employ a dental laboratory technician who takes care of most of the time consuming detail work, and it is recommended that one who has experience in doing prosthetic work should work in conjunction with the physician.

Earlier in the work, the preparation advocated by Dr. Warnekros was employed, a mixture composed of 100 parts of gelatin, 50 parts of glue and 200 parts of glycerin. This material was not durable, for in warm weather such a prosthesis would lose its form. It would also lose

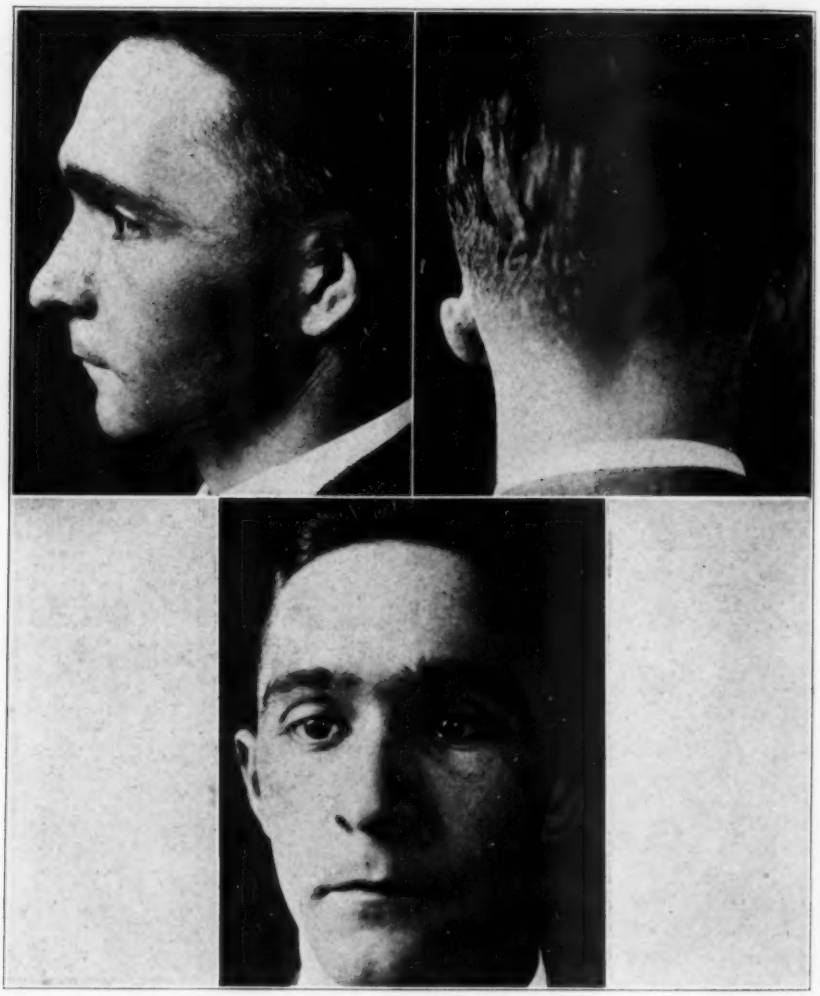

Fig. 10.—Same as figure 9.

its color when boiled, and when glue was added to the mixture, it became less transparent and less elastic, or even brittle. At the present time, with the improved technic, the repeated manufacture of the parts is so simple and inexpensive that no attempt is made to use the same material over again, and the patient can easily procure the additional prostheses or

Fig. 11.—Types of cases illustrating total or subtotal auricular deformities due to various traumatic factors, infections and disease.

even learn to make them from a simple formula. After many trials, the following procedure has been adopted:

TECHNIC

Making the Form for the Ear Prosthesis.—From the side of the missing ear a plaster cast is made covering a sufficiently wide circumference. To avoid hair adhering to the plaster, the hair is first greased with petrolatum and then plaster is applied to the parts, laying it on thickly. This form is allowed to harden slightly before it is removed. A positive plaster cast is then made from this negative one. A plaster cast is also made of the sound ear, if it is a unilateral absence, after having stuffed the meatus with cotton to prevent the plaster from entering. The entire ear and surrounding parts are then thoroughly greased. In order that a cast of the entire ear may be made at one sitting, a thin but strong

Fig. 12.—Same as figure 11.

piece of string is placed along the entire outer margin of the auricle leaving the long proximal ends free. The plaster is then freely applied, even more so than on the side where the parts are missing, being careful that there are no crevices, unfilled corners or bubbles. It cannot be overemphasized that the cast should be of sufficient thickness to prevent breaking when making the positive cast. As soon as the plaster begins to harden, the thread is caught at both ends, carefully drawing the lower end upward, thus cutting the cast into two parts. The mold is allowed to harden and then the two parts are easily removed. The negative casts are put in a solution of soapwater, or the inner surface can be smeared with a thin solution of shellac, adding a little oil. As there is now an imprint of the sound ear, the positive cast can be made.

The ideal material for making impressions is a preparation of plaster which separates itself easily from the positive cast, such as solvite. This material is mixed the same as ordinary plaster that is used for impressions, i.e., in cold water. It is mixed thin and stirred until it begins to set, which takes from three to five minutes, and then it can be applied to the parts. The method for removing

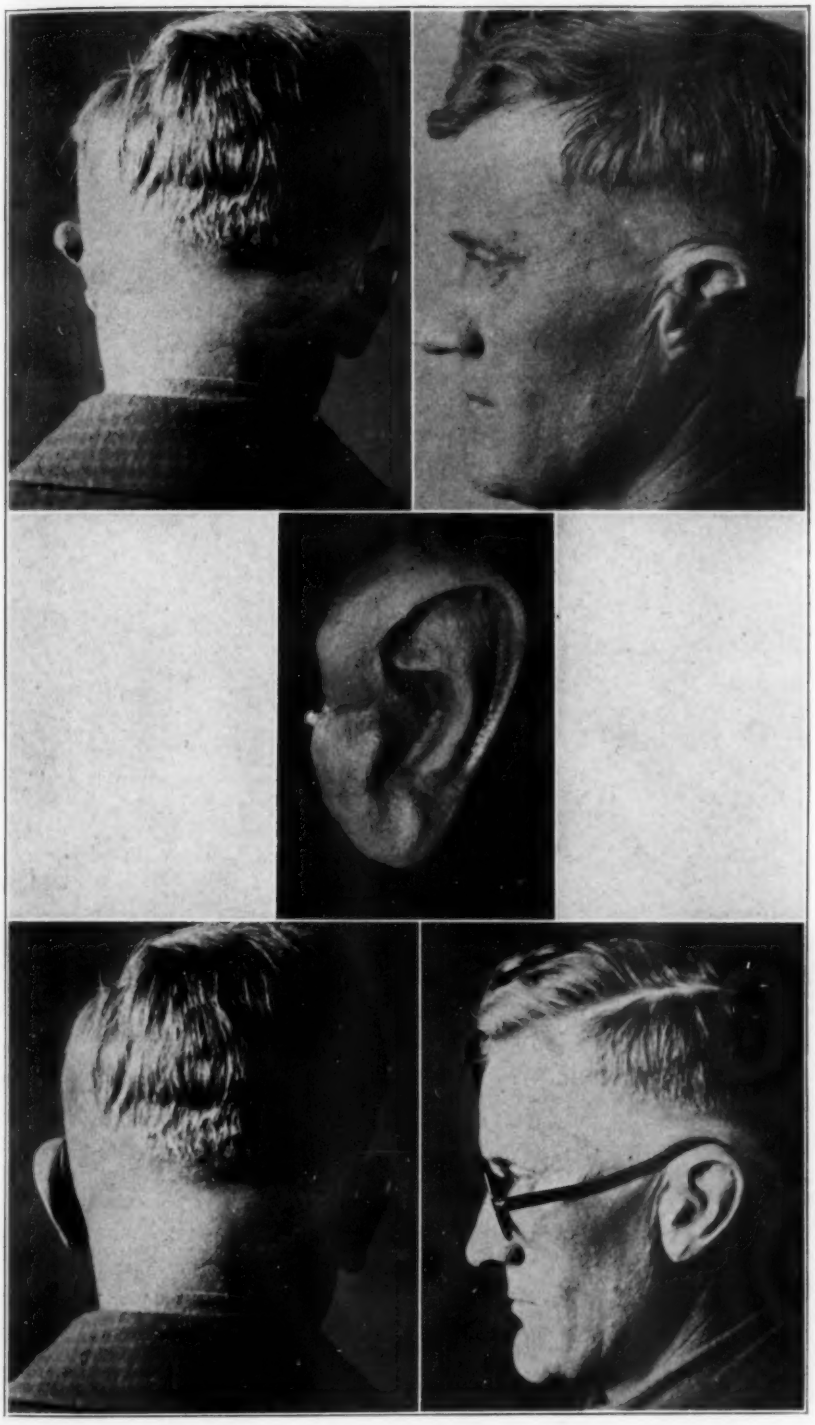

Fig. 13.—Partial loss of the auricle due to injury, showing a correction by means of a metal prosthesis fixed by a tube entering the canal and by a heavy spectacle frame. It will be noticed that this type of ear is conspicuous by its nonelastic appearance and bulkiness.

this material has already been described. The inner surface of the cast is then painted with a thin layer of a colored separating fluid, such as is used in making dental casts. The two parts of the cast can then be waxed or held together by a cord and the usual hard plaster properly poured into it, so that it will fill all parts of the negative cast. Here again, I would warn against allowing bubbles to form in the mixture. As soon as the casting has hardened, it is thoroughly immersed in water and boiled. It takes only a few minutes for the plaster of the negative cast to come away, leaving the positive cast intact.

Now the positive plaster cast of the missing ear is taken, and with the plaster cast of the good ear as a model, a wax ear is made to replace the deficient one. This takes some time and ingenuity and presents its greatest problems when parts of the ear rather than an entire one are missing. The edges of the wax must be made of a tapering hairlike thinness so as to blend with the neighboring parts. Sometimes positive molds of other ears corresponding to the missing side may be

Fig. 14.—A patient having a total loss of the auricle due to trauma, showing same ear with the type of prosthesis as described by the author.

utilized, and with few alterations with the hot wax, may be made to conform to the normal ear. In order for the wax to harden so that the form may easily be removed from the plaster, it should be cooled in a water bath. However, if it should adhere, and in order that the thin wax border should not stick and be wrinkled or destroyed, the plaster may be warmed slightly. This wax model may also be remodeled on the patient and necessary changes may be made. The thin edge should not be too wide and yet should be sufficient to adhere to the patient's skin.

The mold from which the future artificial ears are to be cast is then made from this model. The permanent mold can either be made of plaster or of metal. If real permanence is sought, then the metal mold is recommended. The mold of an ear consists of three parts: a bottom portion, which is the positive of the plaster cast, the part of the ear and the back part. In order that these parts may be properly held together, I make several screw pins. The manufacture of a metal mold is left entirely to the skill of the dyemaker.

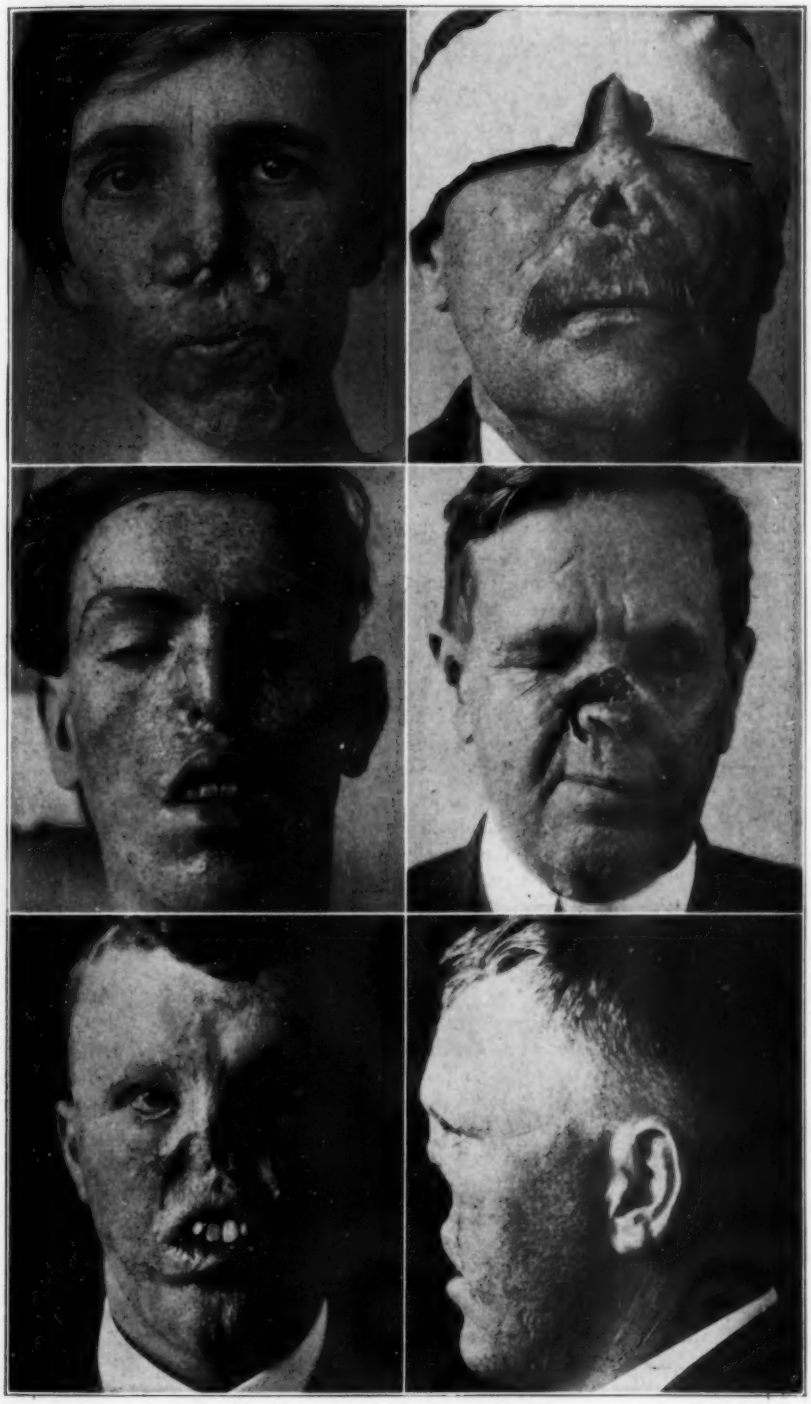

Fig. 15.—Complete and partial loss of nasal structure due to disease (syphilis and tuberculosis). The two photographs at the bottom show the before-stage of a patient who subsequently had over fifty operations in an attempt to build up a nose, but who later came for a prosthesis because of poor cosmetic result.

Preparation of the Form for Nose and Face Prosthesis.—Molds for the nose may be made with greater ease than other missing parts of the face. The molds in these instances consist of two parts: the bottom portion, which is the positive of the defect, and a top part. The negative casts are taken as has already been described, also getting in considerable of the surrounding parts in the impression. The soft plaster (solvite), as mentioned, is best used as the material for the impressions. Before taking the impression, the face and especially the hairy areas are thoroughly covered with petrolatum. If the nose is missing entirely, cotton may be packed deep into the crevices so as to prevent the plaster from entering the nasal cavity. The use of rubber airways in the nose or mouth interferes greatly with the taking of a correct impression, and therefore, if possible, should be abandoned. However, by having the patient take a deep breath and then laying on from 2 to 3 cm. of plaster and having him breath out, the exact position of the openings is indicated. The preparation of the positive cast is done in the same manner as described, except that one has the advantage of taking the impression of a nose directly from a person with like features. It is better to have a photograph before the deformity occurred in order to judge the type of nose necessary.

The preparation of a model of facial defect with a missing eye is somewhat more difficult because here one must be careful so as to adapt the position of the artificial eye to the healthy one. In such instances, an impression of the entire face is taken, and from this is made a positive cast, just as was done in the case of the deformities of the nose. The preparation of the model of the entire face facilitates the accommodation of modeled noses, eyes and other facial parts. In such cases, too, it is useful to compare with the modeled substitute, photographs taken previous to the disfigurement.

The wax forms are then made to fit the defects as shown on the plaster form. In the cases of noses, the septum is inserted to conform to the positive cast and all the edges are thinned in the manner described under ear prosthesis. Suggestions for changes may be gained from trying the wax model on the patient before making the permanent plaster or metal mold. If a plaster mold is used, it may be made into marble-like firmness by first thoroughly drying it and then coating it with stearine.

Preparation of the Raw Material.—About 50 Gm. of bleached gelatin is placed in hot water sufficiently long to soften it slightly, and then it is wrung out. The gelatin is added to 20 cc. of glycerin while boiling in a water bath, stirring it all the while until a homogenous mixture is obtained. White zinc oxide is then added until the color becomes clear throughout the mixture; glycerin is added to make a thick solution. Enough carmine red powder is added to produce a fitting flesh color; 25 cc. of glycerin is again added, all the while stirring so that the mixture does not become lumpy. Oil colors are used to good advantage to give the mixture its proper color. Water must be kept out of the mixture.

This material may be kept on hand for use and softened in a double boiler as the occasion demands. A metal syringe is employed with a bayonet-lock tip for forcing the molten plastic material into the form. An opening for the introduction of this material is made in each mold, and the soft material must be forced in under pressure so as to fill all crevices of the model. It is well to coat the inner surface of the model with a little liquid petrolatum so that the rubber-like material will not adhere. The process is similar to the well known method of vulcanizing tires, and a few minutes usually suffices for the substance to harden so that it can be removed. The edges may then be trimmed with scissors and the uneven edges smoothed with a small warmed steel spatula.

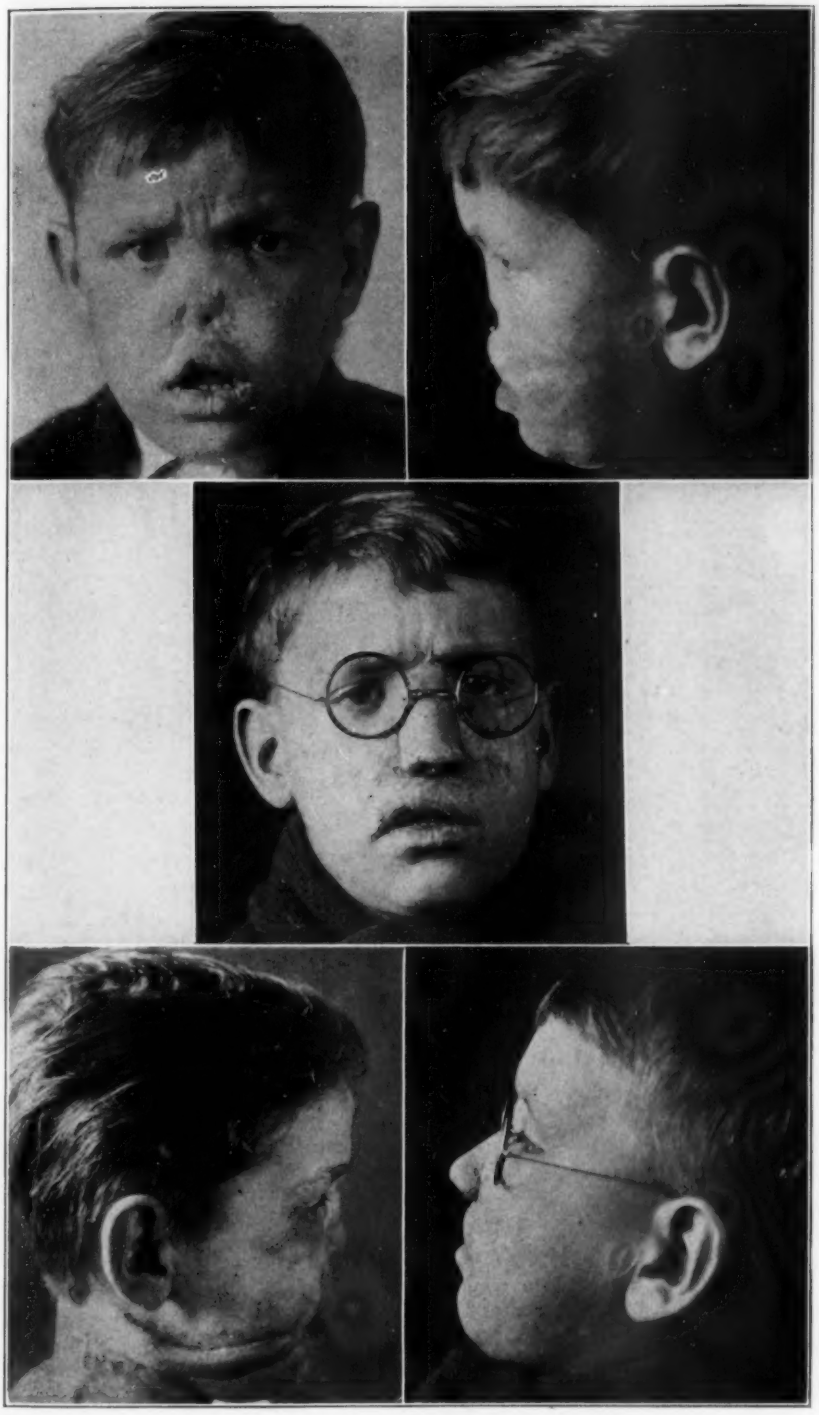

Fig. 16.—A patient with a congenital syphilitic deformity who had innumerable operations in an effort to construct a nose. One of the photographs shows him in the process of one of the many steps, namely, using the tube flap as recommended by Gillies. He is also shown with a metal prosthesis which proved unsatisfactory for the reasons stated in the text of this paper.

The prosthesis can be easily tinted to match the surrounding skin, or as in the case of the ear, to match the healthy one. Liquid rouge and powder may be employed. Women are especially adept at this part of the work. The inner surface and especially the edges may then be brushed with a solution of gum

Fig. 17.—The same type of case which had many surgical plastic procedures. The metal prosthesis was also made for this case and the difficulties as before stated were encountered here.

mastix dissolved in ether and placed in position. The edges are held down for a few minutes until the mastix has dried and the prosthesis adhered. Additional coloring or tinting may be done. Hair may be added, eyebrows and the like if necessary.

This lifelike elastic prosthesis has the advantage that moisture cannot harm it. The prosthesis can remain in place for about two weeks, but the economy of making many, once the mold is made, is apparent, so that the conservation of the same prosthesis over a long period of time becomes unnecessary. If, however, the prosthesis is to be worn in the presence of great heat, it may be dipped into

Fig. 18.—Patient with a syphilitic nasal deformity who had previously been operated on eight times. My type of prosthesis is shown as applied to this case. (University of Berlin, Klocke-Lederer, 1925.)

a 20 per cent formaldehyde solution before attaching it. This should not be done, of course, unless it becomes absolutely necessary, as the durability is lessened. It is remarkable, however, how elastic this material remains under all conditions. I have pieces of the substances which still retain their elasticity after three and four years.

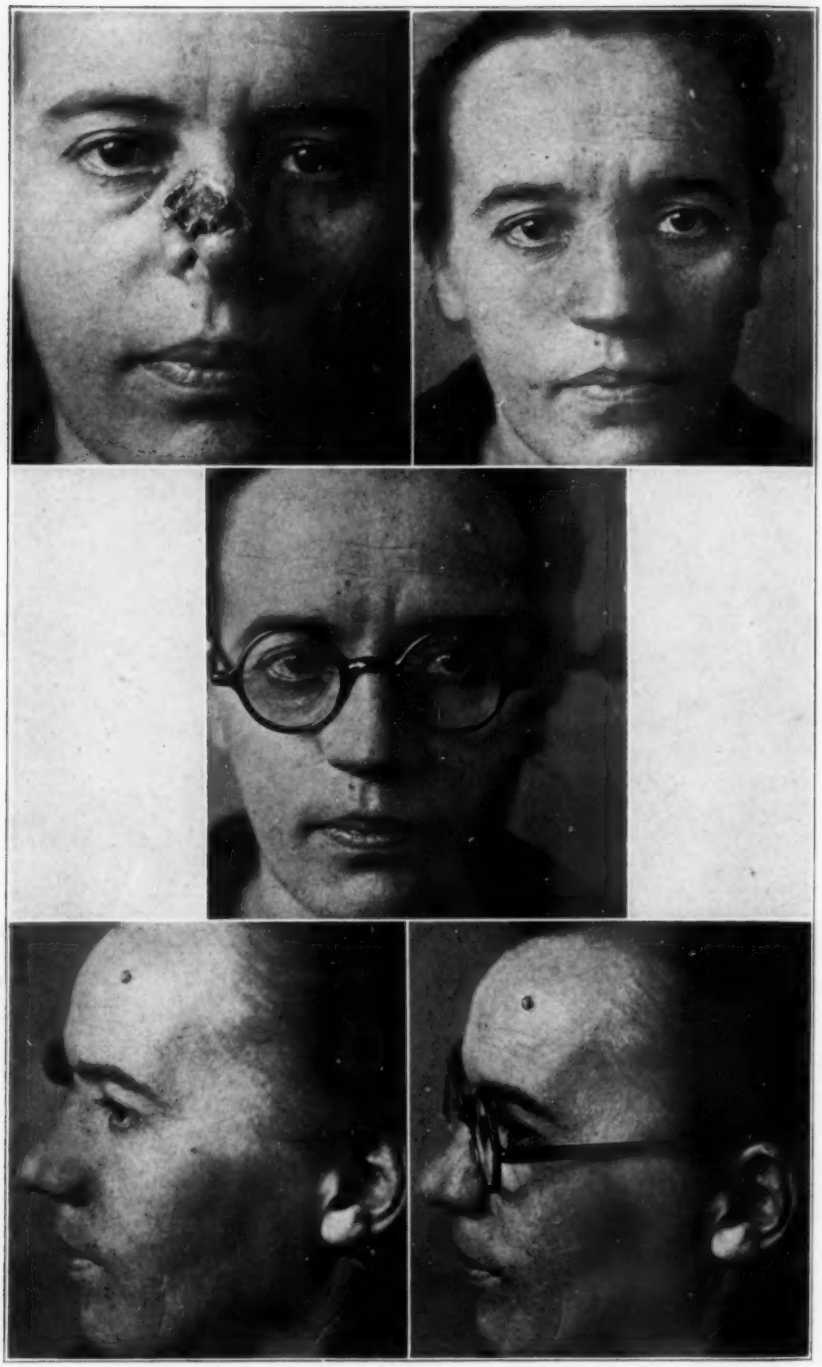

Fig. 19.—Epithelioma of the nose. Most of the nasal structure was removed by operation and diathermia. My prosthesis is shown both with and without spectacles. The advantage of the spectacle frame is that it hides the line of clevage of the prosthesis. Treatment of the epithelioma may be carried on just the same and alterations in the model are possible to accommodate any further destruction of tissue.

Recently, Bercowitsch [8] of the State Medical Institute of Leningrad, published a brief report based on the report of Henning, Salomom, Zinsser and Pont. Their method was to take 75 Gm. of gelatin which had been soaked in cold water, and place in a double boiler, gradually adding 50 cc. of water and 30 cc. of glycerin while the mixture was being stirred. According to Zinsser,[9] the proportion per fifty grams of gelatin is 100 cc. of glycerin. Pont takes 20 cc. of gelatin, 5 cc. of coignet glue, 62 cc. of glycerin and 25 cc. of distilled water. Experience has taught me not to use water in making up my materials as these authors have done. Bercowitsch experimented to do away with the disadvantages and imperfections of the material which he had heretofore been using. The problems which confronted him were the drying out of the prosthesis and the diminution in weight of the original mass which accounted for the wrinkling of the thin borders and lack of durability. He obviated this by changing the proportion of one of the principal ingredients of his mass and kept in mind the hygroscopic nature of the glycerin, which is used in the technical manufacture as a material serving to prevent drying. For this purpose glycerin is used in soap making as well as in the preparation of clay for sculptural purposes. Bercowitsch stated that the material as prepared keeps, without change, its former weight and elasticity. They claim greater stability with the formula as they modified it.

The second imperfection that demanded their attention was the insanitary effect of wearing the gelatin prosthesis. They perceived that after from seven to fourteen days the gelatin mass became somewhat moldy. They avoided this by adding salicylic acid to the mass; the mold did not appear again on the experimental material during the three months of its existence.

Another imperfection that they found means to rectify was the light solubility of the gelatin. It is known that it dissolves in water at 30 C. The gelatin was soaked with a solution of potassium bichromate, which under the action of daylight makes the gelatin insoluble in water. The addition of potassium bichromate gives to the patient wearing a prosthesis the possibility of washing with warm water.

Their clinical recipe is as follows:

Ten grams of gelatin is soaked in 50 cc. of glycerin; the surplus, about 33 cc. is poured out, after which the gelatin is carefully pressed out in a towel, is heated in a double boiler and the following added:

Glycerin	15.0 cc.
Distilled water	7.5 cc.
Brandy	5.0 cc.
Salicylic acid	0.5 Gm.
Potassium bichromate	3 drops

8. Bercowitsch: Dental Cosmos, February, 1928, vol. 70.
9. Zinsser: München. med. Wchnschr., 913, vol. 49.

No doubt as this method becomes better known, there will be modifications on modifications. I, too, am constantly working to attain an even more satisfactory material than I have at present, and perhaps in the future a perfect formula will be attained.

It is far more difficult to replace by prosthesis parts of ears, for example, than to replace the part in toto, but it has been my experience that these patients will not consent to having any remaining part removed by surgical procedures. It is therefore neecssary, in many instances, to cover useless lobules and folds of skin that could well have been eliminated. In such cases, the prosthesis has not been made without its critical points, but at least the patient's desires have been complied with. While mechanical appliances will not take the place of nature, yet by this method many persons can be relieved of untold embarrassment, suffering and economic loss.

30 North Michigan Avenue.

THE PREVENTION OF NASAL DEFORMITIES FOLLOWING SUBMUCOUS OPERATION *

WILLIAM WESLEY CARTER, M.D.
NEW YORK

The submucous operation is the most effective measure devised for relief from nasal obstruction due to deviation of the septum.

If precautions are observed, it is my belief that this operation may be performed with a minimum amount of weakening of the nasal structure and without injury to the contour of the nose. It is a legitimate operation, but one with distinct and unusual reservations. It is well, therefore, that careful consideration should be given each case before operation is advised, for it may be followed by deformity even when performed by a skilful surgeon. It demands minute attention to details, technical skill and manual dexterity on the part of the surgeon; the last mentioned requirement is frequently overlooked.

Deviated septums are common in childhood. They are said by competent authorities to be present in 75 per cent of the adults of the caucasian race. In fully 50 per cent of these the deviation is sufficiently pronounced to cause symptoms that call for surgical intervention. These facts justify the statement that the demand for the operation is great. In popularity and frequency with which it is undertaken, it probably ranks next to tonsillectomy. It is well, therefore, that the dangers attendant on and following the performance of this operation be understood by every surgeon doing this work, and that he be well advised concerning the best means for avoiding them. That there is need for this warning is attested by the increasing number of persons who come to me for the correction of nasal deformities due directly to this operation.

Preventive measures may be considered from the following points of view: (*1*) the septum as a factor in the development of the nasal arch and the effect which its removal during childhood has on the shape of the nose; (*2*) the function of the upper edge of the septum as an important segment of the nasal arch; (*3*) the septum as a vertical support of the nasal arch, and (*4*) the operative technic.

The part which the septum plays in the transformation of the flattened, stubby nose of the infant into the organ of adult proportions is so important that reference to the dynamics of nasal development is essential to a basic understanding of the subject under discussion, especially as it relates to septal operations on children. The following is a

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* Read before the American Laryngological, Rhinological and Otological Society, Washington, D. C., May, 1928.

quotation from a paper read before the New York Academy of Medicine on April 26, 1906: "While I am convinced that the septum, as a vertical support, takes no part in the preservation of the contour of the nose, I am equally certain that it does take a most important part as one of the forces in the development of the symmetrical organ, and therefore should not be removed during the years of most active growth." My experience now prompts me to emphasize this statement made twenty-two years ago.

The earliest division between the nasal cavities is effected by the vomerine cartilage. This is chiefly a fetal structure, as only the portion which constitutes the septal cartilage remains during adult life. The vomerine cartilage is covered on either side by a membrane. During the eighth week of fetal life an osteogenetic center makes its appearance in the lower, posterior portion of this membrane on both sides. From this point osteogenesis proceeds upward and forward. In the same order the two plates of bone, as they develop, unite to form the vomer, the cartilage between them being gradually absorbed or pushed forward. At the anterior edge the plates do not coalesce, but form a gutter into which fit the septal cartilage and the vertical plate of the ethmoid. Should there be complete failure of these plates to unite, there is a double septum with an interval between, the resulting deformity being known as wolf nose.

The growth of the septal cartilage and of the vomer forward and upward plays an important part in the raising of the bridge of the nose. That this vertical pressure is great is attested by the frequency of septal deviations and spurs at the juncture of the vomer and the septal cartilage, and, conversely, when the septum is destroyed by accidental traumatism, operation or disease in early life, the infantile type is retained and a stubby, flattened nose is the result. It may be said that the elevation of the nasal bridge is due to the unequal growth of related parts, the septum being the dominant factor.

These facts clearly indicate that the submucous operation should not be performed before the eighteenth year, unless the demand for it is imperative. Even then only a palliative, highly conservative measure should be adopted; one that will conserve the potential energy in the undeveloped septum, and that will give at least some relief from the obstruction until the nose is fully developed, when a more radical operation can be done safely.

The important function of the upper edge of the septum and its bearing on the submucous operation can best be understood by considering the nose from an architectural point of view. The rigid framework of the nose constitutes an arch; that is, it is a curved structure, made up of an indefinite number of segments, so placed that it is independent of outside support, save at its extremities. The septum, as

a vertical support, strengthens the structure, but is not necessary for the preservation of the arch, save for the fact that its upper edge, wedged in between the lateral cartilages, constitutes the keystone, the most important segment of the arch. If this segment is displaced during the performance of the submucous operation, or if it is destroyed later by

Fig. 1.—Saddle-back deformity resulting from injury to the septum in childhood. Correction was obtained by transplantation of bone and cartilage.

infection, the adjacent segments of the arch fall together, and the nasal bridge is established on a lower level, constituting a saddle-back deformity. The prevention of this accident, so closely associated with the operative technic, will be discussed later.

The septum as a vertical support strengthens the nasal arch especially at its free extremity, and greatly increases its resistance to traumatism. One must concede, therefore, that removal of even a portion of it weakens the structural framework of the nose. This weakness, however, should not become clinically apparent, other things being equal, if the proper precautions are taken when the operation is performed.

It is clear that no more of the septum should be removed than is absolutely necessary to relieve the obstruction, and that discretion must

Fig. 2.—Child, aged 12, showing deformity resulting from injury to septum when 4 years of age.

be used concerning which portions are removed and how much encroachment is made on areas that are known to be of strategic value in supporting the nasal arch. One must concede that it is better to sacrifice intranasal cosmetics in favor of preserving the strength of the framework, even though a slight obstruction may still persist.

OPERATION

A detailed description of the submucous operation will not be given; my purpose here is to direct attention to those points in the technic that have direct bearing on the prevention of deformities.

My armamentarium, which may seem too simple when compared with the elaborate outfits on the market, consists essentially of a submucous knife, punch-forceps and a combined elevator and curet. These were all designed by me many years ago, and, no doubt, most otolaryngologists are familiar with them.

Recognized precautions against infection both from without and from within the nose and its accessory sinuses should be rigidly observed.

Before operation, my custom is to cleanse the nasal cavities with physiologic sodium chloride solution, and then paint the nasal vestibules and surrounding skin area with iodine, followed by alcohol.

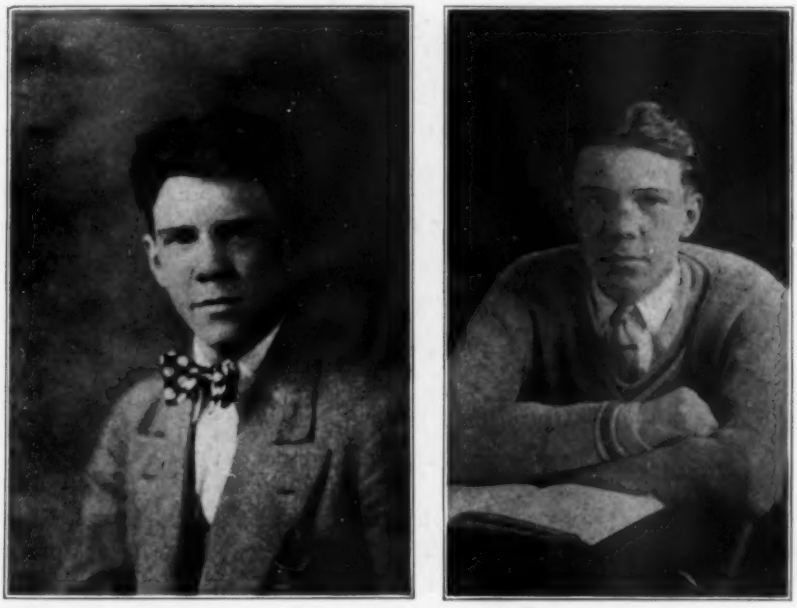

Fig. 3.—Deformity due to injury in early life which crumpled the septum. Submucous operation was followed by deformity. Correction was obtained by transplantation of bone and cartilage.

In performing the operation a move should not be made without first considering its possible effect on the nasal development or on the strength of the framework of the nose. As I have stated, weakening of the latter cannot be avoided, but one can limit this to such an extent that there will never be a spontaneous clinical manifestation of weakness.

I do not favor the use of the swivel knife, as the amount of the cartilage removed cannot be regulated, and traction on the dorsal segment of the septum cannot be avoided.

The dorsal segment of cartilage should be left as wide as possible, and great care should be taken not to displace its upper edge. If the

desired result can be secured, it is advisable to punch out the cartilage in such a manner that the lower edge of the dorsal segment will be an arch, with an ample margin of tissue at the junction of the bony and cartilaginous bridge and preservation of the anterior margin of the quadrangular cartilage. The latter is firmly attached to the anterior nasal spine and is an important prop to the nasal tip.

The anterior nasal spine, if it is causing obstruction, should be pared, but not removed in its entirety, because it is the basic attachment for the anterior end of the quadrangular cartilage, and because its complete removal obliterates the normal curve between the septum and the lip.

The columnar cartilages are not necessary to the support of the nasal tip; so dislocated, obstructing portions of these may be removed with impunity.

After performing the operation, I use, instead of packing, two gold wire splints molded to fit the nose at the time of the operation, as

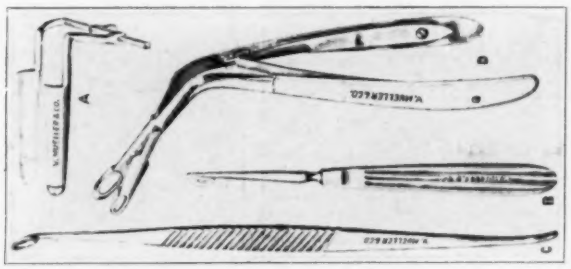

Fig. 4.—Set of instruments used in submucous operation.

originally described by me before the American Laryngological, Rhinological and Otological Society. These keep the submucous flaps pressed together and limit the liability to hematoma; besides they permit the patient to breathe through the nose and facilitate cleansing. These splints are left in for twenty-four hours.

Of the complications following this operation, infection and hematoma have the most important bearing on the production of deformity. Unless infection is detected early and eliminated promptly, the upper segment of the nasal arch will be destroyed with resulting deformity.

Hematoma should be regarded as a potential abscess and treated as such. I have found the following treatment effective: The submucous sac is opened through the operative wound, and the pus or blood is evacuated. After irrigating the cavity with physiologic sodium chloride solution, it is wiped dry and then swabbed out with pure carbolic acid, followed by alcohol. I do not insert a drainage, but introduce the gold wire splints which keep the flaps together and favor cleansing. Rarely is it necessary to repeat this treatment.

The general health of the patient may be the determining factor in the production of a deformity following the operation. Latent, tertiary syphilis is most to be feared. I have seen several cases of pronounced deformity in syphilitic subjects when it was said that the necrotic process in the septum was incited by the submucous operation. When there is the slightest suggestion, therefore, one should satisfy himself that the disease is not present.

Fig. 5.—Nose injured when subject was 10 years of age. Submucous operation was followed by deformity. Correction was obtained by transplantation of bone and cartilage.

Deformities following the submucous operation may be corrected by the transplantation of cartilage or periosteum-covered bone from the patient's rib in a manner described by me many years ago. I frequently use conjoined bone and cartilage, the transplant being taken at the junction of the rib with the costal cartilage. This modification of my

original operation, which I suggested in 1915, has the advantage of preserving the resiliency of the nasal tip. At the present time I am using both bone and cartilage, either combined or separately, and believe that each tissue in its proper place has its advantages.

Cartilage should be used without its perichondrium, as the latter causes the transplant to curl. This tissue remains exactly as it was when introduced; it does not form a firm attachment to the bone; hence it remains movable to a certain extent. It has a distinct advantage in being more easily shaped to suit the deformity.

Live transplants of periosteum-covered bone become firmly attached by osseous union to the frontal bone and underlying nasal bones. When properly contacted they are not absorbed, as has been shown by many roentgenograms made years after operation by Dr. Law. Transplants of bone grow in proportion to the strain placed on them, but overgrowth has never been noted. Slow absorption of the transplant may occur if the wound becomes infected and the transplant is temporarily saved, or if the proper contact is not made and maintained with the frontal and nasal bones. When the transplant is absorbed apparently it is replaced by connective tissue which maintains the correction.

CONCLUSIONS

The following conclusions are drawn from my clinical experience.

1. The submucous operation is the best measure so far devised for relief from nasal obstruction due to a deflected septum; it should not be followed by deformity if certain precautions are observed.

2. The septum is an important factor in the development of the nose, and consequently should not be removed before the eighteenth year unless the demands for relief are urgent.

3. The upper edge of the septum constitutes an important segment of the nasal arch and must not be dislodged during the operation. The free edge of the quadrangular cartilage is important as a vertical support and should not be destroyed.

4. The septum should be removed by means of punch-forceps, which make no traction on the dorsal segment and which permit of accurate selection of the portion removed. This selection should always be exercised and only the obstructing portions of the septum removed.

5. Deformities resulting from this operation are best corrected by the transplantation of bone and cartilage from the patient's rib. Otolaryngologists are familiar with my original operation, described many years ago.

Cartilage remains indefinitely exactly as it was when introduced. It never becomes firmly attached to bone, and hence is movable to a

certain extent. It should be used without its perichondrium, as the latter causes the implant to curl.

Transplants of periosteum-covered bone become firmly fixed by osseous union to the frontal bone and to the underlying nasal bones. When properly transplanted, they are not absorbed, as has been shown by numerous roentgenograms made many years after the operation by Dr. Law. The bone remains alive, and its growth is in proportion to the strain placed on it. Overgrowth has never been noted.

Correction may be made by bone or cartilage alone, or by conjoined bone and cartilage as indicated, the transplant being taken at the junction of the rib with the costal cartilage.

2 East 54th Street.

Clinical Notes

MIGRAINE CONTROLLED THROUGH THE NASAL GANGLION

LAWRENCE K. GUNDRUM, M.D., LOS ANGELES

Migraine has been known as such almost since the beginning of the knowledge of medicine. Liveling,[1] in his classic book, described migraine as a unilateral or bilateral headache, beginning usually at the age of puberty, seldom after the age of 30, and continuing until middle life. It is characterized by periodic attacks and is usually accompanied by prodromal symptoms. Exciting causes may be gastro-intestinal disorders, menstrual periods, emotional disturbances or physical or mental strain. It varies from a mild headache to severe prostration with nausea and vomiting. Visual symptoms consisting of distortions of the visual field and psychic disorders may precede the pain. The case given below seems to fall under this classification. The severe attacks began with the first menstruation; they were periodic, and gradually increased in severity, and the patient was able to determine each impending attack. Visual symptoms, however, did not occur. Several members of the family had had similar attacks of much less severity.

The relation of migraine to nasal conditions has only recently been studied. Sluder[2] reported cases of ophthalmic migraine in which the patients were relieved by treatment of the nasal sinuses. He also mentioned one case of vulgar, and several cases of ophthalmic, migraine which were controlled through the nasal ganglion. In a search of the literature, I have been unable to find a case similar to the one reported herewith.

REPORT OF A CASE

History.—Mrs. B., aged 37, came under observation on Nov. 24, 1925, complaining of headaches. Her father died at the age of 45 of cardiorenal disease; her mother, at 45 of apoplexy. One maternal aunt had attacks similar to those of the patient; another had an occasional mild attack. The mother was subject to headaches. Seventeen persons on the maternal side had been operated on for uterine fibroids.

The patient had the usual childhood diseases and night terrors and somnambulism in childhood. She was married at the age of 27, but had never been pregnant. The menstrual periods had been very irregular and had always been accompanied by severe pain in the uterine region. She had always been incapacitated from one to six days at each menstruation.

Present Illness.—At the age of 11, she had frequent dull frontal pain and had been forced to stop school for several months owing to her inability to study because of this discomfort. She had had an occasional headache but not a severe one until the age of 16, when she first menstruated, and was quite ill. During the next year, she had two severe attacks. These attacks gradually increased in frequency and severity until they were present at each menstruation and often between periods. During 1923 she had the most severe attacks; from October of

1. Liveling, Edwin: On Migraine, Sick-Headache and Some Allied Disorders, London, J and A Churchell, 1873.

2. Sluder, Greenfield: Nasal Neurology, Headaches and Eye Disorders, St. Louis, C. V. Mosby & Company, 1927.

that year until April, 1924, she remained in bed and took morphine, codeine and many other drugs constantly without relief. Intravenous injections of peptone were begun about Jan. 1, 1924.

The records of Dr. Tom Throckmorton for March 7, 1924, contain the following notation: "Blood pressure 140 systolic and 90 diastolic. Soft systolic blow over mitral and aortic areas, with accentuation of aortic sound. Lungs negative. Pelvis normal. Laboratory observations, including stool, complete blood examination, renal function, urine, gastric analysis and Wassermann test, were negative. Dr. C. E. Worts reported small amount of astigmatism in each eye and retina congested; otherwise results of eye, ear, nose and throat examinations were negative. Tentative diagnosis: migraine, hypertension and hypo-elimination." The constipation was corrected successfully.

The husband made a complete record of the patient's condition from Jan. 4, 1925, until my observation on November 24, as he stated, "to see if she were getting any better." During the first seven months biweekly intravenous injections of peptone solution were given. For the first four months, slight improvement was noted. Later the injections seemed to aggravate the condition, and they were then discontinued. During the nine months recorded, the patient had forty-seven typical attacks, each lasting from one to three days. Thirty hypodermic injections of morphine sulphate of ¼ to ½ grain (0.016 to 0.032 Gm.) each were given. These were supplemented by large doses of codeine, acetylsalicylic acid and other sedatives. The patient had several attacks of persistent hiccup lasting from one to three days, often persisting while she was under the influence of a narcotic. Many hysterical symptoms manifested themselves, such as attacks of uncontrollable crying and great mental depression.

The following is a description of a typical attack on Dec. 1, 1925. The night before the attack the patient was, as she expressed it, "so hungry she could hardly wait for dinner." Her husband stated with absolute surety that she would have a "headache" the next day and gave an exact description of what would follow. His prediction was true in every detail. Immediately after an unusually large dinner, the patient went to bed and slept soundly until about 8 a. m. She ate very little during the day. At 6 p. m., pain was present at the root of the nose. This soon radiated to the right eye, right temple and mastoid. Finally the entire right side of the head was affected. In about five minutes, the other half of the head was similarly involved. About ten minutes later, vomiting began. This was almost continuous, with great retching, and the vomitus was pure bile. The muscles of the face were first drawn to the right side, then apparently upward on both sides. Both nasal ganglions were cocainized, and complete relief was obtained in two minutes.

Examination (made later).—The results of a general physical examination were normal, except that the patient was under weight and the systolic blood pressure was 150 mm. and the diastolic 80 mm. Examination of the ears, nose and throat showed a slight deflection of the nasal septum to the left and some hyperplasia of the plica septums and posterior tips of both middle turbinates.

Course of Illness.—December 8, the patient had an attack similar to the one described, and cocainization gave complete relief. This was repeated on four different occasions, with relief in each instance.

On December 12, 0.5 cc. of a 5 per cent solution of phenol in 95 per cent alcohol (Sluder method) was injected into both nasal ganglions. Relief was complete until May 10, 1926, when there was a slight recurrence. As the family was contemplating leaving the state for business reasons, it was deemed advisable to make further injections. This was done on May 15. Relief was complete

until September 15, when the patient had a slight headache. Since that date, she has not had any return of symptoms. She has been under a great nervous strain and has held a responsible position for a large corporation for the past year. Her general health has been good; she has gained in weight and has been entirely free from all previous complaints.

COMMENT

This case presents unusual features. Severe attacks began at the age of puberty and gradually increased in frequency and severity. At first, they appeared only at the menstrual periods; later, they occurred between periods, and were always present just before or during menstruation. The menstrual periods became very irregular and were associated with great prostration and pelvic pain. After treatment of the nasal ganglions, menstruation became normal. The patient was incapacitated from active life for seven or eight years. The seeming hypochondriasis has entirely disappeared. If this is a case of migraine, the question arises as to what part the nasal ganglion played in the syndrome. The cause of migraine has of course, not been definitely proved. There is no doubt that the gastrointestinal tract plays an important part. The nervous mechanism also is important. Buch [3] has proved that the sympathetic nervous system carries pain impulses, at least under pathologic conditions. If this is true, it seems reasonable to suppose that the nasal ganglion is a link in the chain which carries impulses of pain causing the symptoms of the type of pain which is called migraine. Removal of this link relieves the symptoms. This is in accord with the theory of pathologic currents described by Byrd.[4]

It may seem somewhat fanciful to suppose that actual neuritis of the ganglion would set up false impulses and cause the syndrome; however, the cases reported by Sluder [2] and the one contained in this article might give rise to such a question. I do not propose treatment of the nasal ganglion in all cases of migraine; but if after exhaustive study a pathologic condition cannot be found, I believe that one is justified in cocainizing the ganglion. If this gives relief on a number of occasions, there may be some hope of relieving the symptoms by such injections. If one cannot find a proved cause, it seems justifiable to make the patient comfortable.

1920 Wilshire Boulevard.

A NEW NASAL BRACE

JOSEPH SAFIAN, M.D., NEW YORK

In the correction of a crooked nose, the important element is the maintenance of the nasal bones in the new position until sufficient callus has formed to produce a natural attachment.

Various devices have been used for the purpose, the earliest one being the use of adhesive tape. This was followed by various types of braces, the most

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3. Buch, Max: Die Sensibilitaetsverhaeltnisse des Sympathicus und Vagus mit besonderer Berueeksichtigung ihrer Schmerzempfindlichkeit im Bereich der Banchhochle, Arch. f. Physiol, 1901, p. 197; St. Petersburg Med. Wchnschr. **17**:131 and 141, 1901 (copied from Sluder).

4. Byrd, Hiram: Pathological Currents and Hay Fever, Am. Med. n. s. **23**:169 (March) 1928.

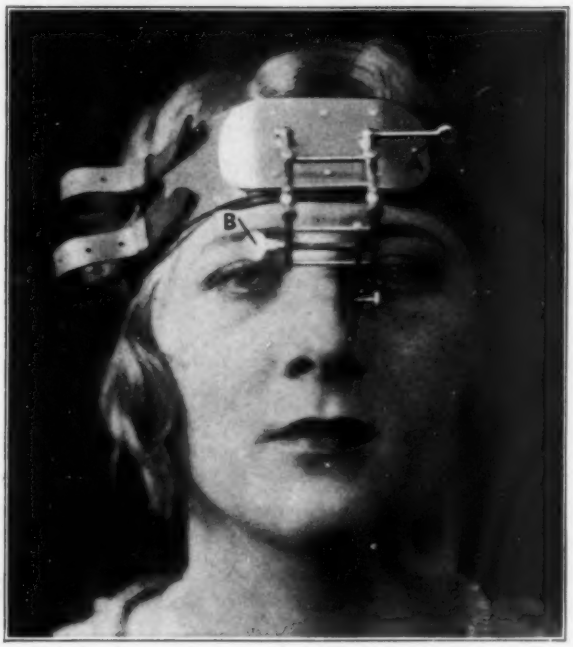

Fig. 1.—Front view of brace, showing *A*, set screw for raising or lowering pelotte and *B*, adjusting screw for moving pelotte to right or left.

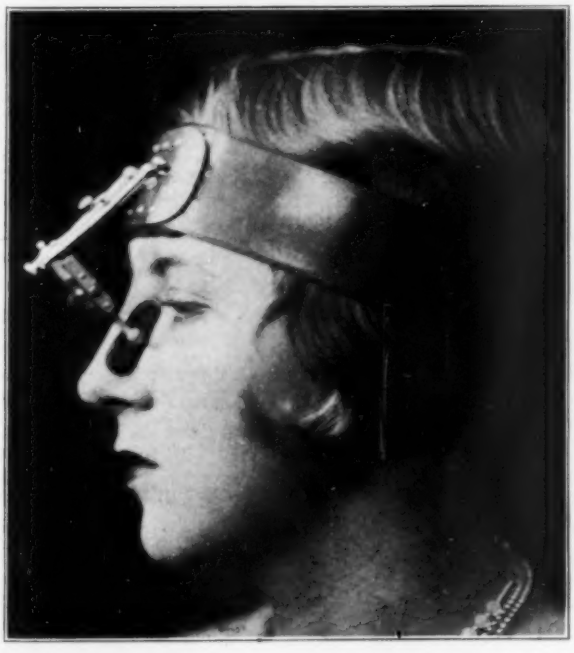

Fig. 2.—Side view of brace showing even pressure applied to side of nose.

commonly employed being that devised by Joseph of Berlin. Nearly all rhinoplastic surgeons of my acquaintance agree that the brace in use has many disadvantages. Patients complain of severe headaches, when the nasal pelotte is tightened; furthermore, the long round shank frequently turns, so that when much pressure is applied it rides over the dorsum of the nose.

The brace presented herewith has several advantages.

1. The head band is adjustable to the various shaped heads by a series of three adjustable straps in the rear.

2. The metal plate in front is made of pliable copper, permitting it to be bent to conform to the shape of the forehead.

3. Attached to the metal plate are two shanks which can be extended or shortened by a set screw. These shanks can be raised or lowered by means of a set screw (*A*).

4. The lower part of the apparatus, the "pelotte holder" sets into the shanks at right angles. This allows the bringing of the pelotte into place easily. Furthermore, it permits, in connection with the new head band, the application of powerful pressure against the nose without moving the head band out of place.

5. The pelotte itself is turnable and exchangeable, so that the same apparatus may be used to apply pressure to either side of the nose.

The apparatus is simple to operate. It fits any nose without the use of special parts. Pressure is applied in a horizontal direction by simply turning set screw (*B*).

A TWO WAY ANTRUM IRRIGATING TROCAR AND CANNULA, MODIFICATIONS OF TWO OTHER INSTRUMENTS

T. H. Odeneal, M.D., Beverly, Mass.

The two way antrum irrigating cannula was designated for use when the natural openings of the antrum are blocked, but I find it useful at all times for irrigating purposes. Its introduction is not any more painful than that of the smaller ones on the market, and the opening is readily found at each introduction, which is not the case with the smaller trocars. Also, a certain amount of drainage occurs between treatments.

The trocar, which has two channels bored through it, has a detachable handle which is removed after the antral wall has been perforated, and the irrigating tube is attached to the trocar-cannula, when there is a steady stream to and from the antrum.

A description of one of the instruments was published several years ago in the *Annals of Otology, Rhinology and Laryngology.*[1] The instrument, which has since been modified, and which I have employed exclusively for seven or eight years, is a nasal splint devised for use after submucous resection. It has been such a help

1. Odeneal: Ann. Otol. Rhinol. & Laryngol. **33**:769 (Sept.) 1924.

to me during these years that I wish the members of the surgical profession to realize its advantages and to give it a trial. I am sure they will never again use packing in the nose after the operation, or leave the nose without packing. The splints are made of metal, and after the operation one splint is placed on each side of the nose along the floor, the ends just appearing at the anterior choanae of the nose. A small hole in front of each split allows a thread to be run through and the splints to be tied together outside the nose. These are borne comfortably by the patient; in fact, I have never heard a patient complain of them.

Previous to the introduction of the splints, a small wad of cotton, flattened out, is placed between the anterior tip of the middle turbinate and the septum on each side.

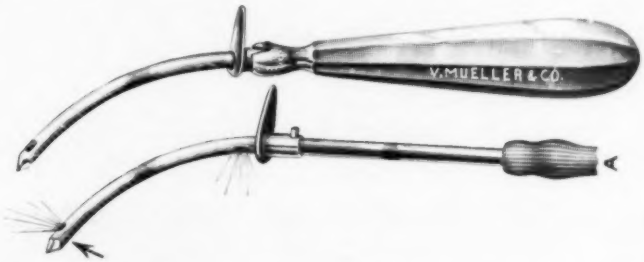

Fig. 1.—Two way trocar cannula for flushing out the antrum. The upper illustration shows the instrument with handle attached, and *A*, with handle replaced by irrigating cannula.

Fig. 2.—Metal splint, lateral view.

With the splints in place, the patient is enabled to breathe through the nose and swallow without difficulty; he has a restful night and does not become toxic, as is the case when packing is employed; therefore he is in good spirits and feels well the next morning.

The splints retain the flaps in place without too much pressure. When too much pressure is employed, an after-congestion results often with the formation of a hematoma. When a packing is used, infection of the nose and throat are not infrequent, not to mention the discomfort caused the patient by its presence.

The splints are removed the day after the operation, and there is no bleeding at this time; the cotton wads are also removed; the nose is found to be clean, and there is no congestion of the mucous membrane after removal. I employ these splints in every submucous resection, and since using them I have never had

a hematoma of the septum or infection of the nose or throat develop after the operation, and the time of convalescence has been materially reduced.

I am not impressed with the method, advocated by some, of omitting all packing or any form of support to the flaps after the operation. In several cases in which I attempted this I found that healing was much delayed owing to the thickness of the septum, and the danger of hematomas was much greater; these tumors occurred in two of my cases. It is impossible to prevent bleeding between the flaps, notwithstanding the fact that a counter incision is made low down posteriorly in one of the flaps in order to allow this seepage to escape. This results in a thick septum, which requires some time for absorption and is uncomfortable to the patient.

In addition to these instruments, I have been employing a permanent cannula for several years, especially for children; this is inserted below the inferior turbinate and left in place until healing of the antrum has occurred. I have

Fig. 3.—Metal splint, indicating the diameter.

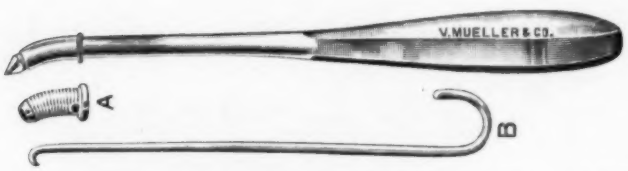

Fig. 4.—Permanent antrum cannula with handle for insertion. *A* indicates the cannula as it appears inserted; *B*, the hook for removing the cannula.

modified this instrument several times until I have found it satisfactory for the purpose intended. It is especially applicable in subacute cases, and is desirable for children.

If difficulty is encountered in introducing the cannula, a slightly larger opening may be made by first puncturing with a larger trocar, such as the antrum rasp; but the opening made should not be rasped, as it will then be too large to retain the cannula. The patient is enabled to keep the antrum flushed out by holding the head forward and downward and irrigating the nose while in this position by means of a rubber bulb nasal syringe or a fountain syringe.

The cannula is short and curved and is fenestrated outside to retain it in place. It is introduced by a special trocar, which is withdrawn, leaving the cannula in place. There is a small opening in the nasal end of the cannula by means of which it may be withdrawn by a specially devised hook at any time it is desired.

A NEW INSTRUMENT FOR SPRAYING IODIZED OIL INTO THE TRACHEOBRONCHIAL TREE*

JOSEPH W. MILLER, M.D., NEW YORK

Of the several methods now in vogue for getting iodized oil 40 per cent into the trachea and bronchi, none is sufficiently adequate to give complete satisfaction. The most important methods now in use by which the oil is brought in contact with the lower air passages are: (*a*) indirect laryngoscopy with curved laryngeal syringe; (*b*) direct laryngoscopy with straight laryngeal syringe or with syringe and soft rubber catheter; (*c*) injection through the cricothyroid membrane; (*d*) through the act of swallowing, after cocainization of the soft palate, root of the tongue and posterior wall of the pharynx. This method is largely used by roentgenologists.

The injection of iodized oil 40 per cent by indirect laryngoscopy is uncertain and troublesome, because the patient frequently has an attack of coughing, owing to irritation of the larynx and spasm of the glottis which, thus, forces the oil violently from the larynx.

Instrument for spraying iodized oil 40 per cent into tracheobronchial tree.

The method by which iodized oil 40 per cent is brought into the lower air passages by way of direct laryngoscopy is also uncertain, because only part of the circumference of the walls of the trachea and bronchi comes in contact with the fluid, and because direct laryngoscopy is not always feasible and is often agonizing to the patient.

The method of injecting the oil through the cricothyroid membrane is rather hazardous and uncertain, and should not be attempted.

The fourth method mentioned, while easily accomplished, is successful in certain cases only, as not all patients, even after cocainization, are able to direct the oil into the larynx during the act of swallowing. Also, some patients with the pharynx cocainized will, during the act of swallowing, drive the fluid through the nasal chambers.

Considering the aforementioned drawbacks, I thought of the cocaine sprayer devised by Seiffert of Berlin; I tried to force oil through it, but failed because of the narrow lumen.

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* From the Laryngologic and Bronchoscopic Clinic, Beth Israel Hospital, service of Dr. Samuel J. Kopetzky.

I then set out to construct an instrument on similar lines—one which would easily transmit a fine spray of oil simultaneously covering the entire circumference of the tracheobronchial walls and readily reaching into the smallest ramifications of the air passages.

DESCRIPTION OF THE APPARATUS

To a 15 cc. graduated, flask-shaped bottle is attached a pliable tube by means of a bayonet lock. The end of tube is bulbous, so that no injury can take place when it is in contact with the walls of the air passages. The lumen of the tube is adequate easily to permit a free spray of iodized oil 40 per cent. The hub which is attached above the bayonet lock will fit the cut-off to any Soerensen machine, or, in its absence, an ordinary rubber bulb may be used.

With this instrument the trachea may be entered by way of indirect laryngoscopy, as the tip of the instrument can easily be bent to the required angle. When entrance has been made into the windpipe, by tilting the instrument, the right or left main bronchus, as occasion requires, may be entered. Also, with the direct method, this apparatus may readily be used through any laryngoscope or tracheoscope.

305 East Seventeenth Street.

Progress in Otolaryngology

Summaries of the Bibliographic Material Available in the Field of Otolaryngology

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ADVANCES IN THE FIELD OF ALLERGY AS RELATED TO OTOLARYNGOLOGY DURING THE YEARS 1927 AND 1928

W. W. DUKE, M.D.
KANSAS CITY, MO.

The following review of some of the literature of 1928 and of 1927 is by no means complete, nor is the bibliography complete. The vast amount of literature which is appearing on the subject of allergy far exceeds the capacity of an article of this scope. Instead of endeavoring to make the review complete, I have tried rather, through a series of reviews, to show the drift of thought in this line of work. In the literature, one finds the definite advances in the knowledge of allergy which has characterized the previous years and which now almost seem to justify the increasing number of physicians who are entering this field as a specialty.

It seems to me that the phenomena of allergy have been adequately proved to be a common cause of both serious and mild disease, affecting, as it apparently can, almost any active tissue in the human organism. In many localities, it can give rise to functual or organic disturbance which can simulate closely many illnesses caused by other diseases. It seems almost necessary, therefore, that physicians in all lines of work be on the look out for the condition and recognize it, and plan their therapy accordingly. While allergy simulates many illnesses, it rarely simulates them perfectly, and, as a rule, it can be completely differentiated from diseases of other sources. It is becoming increasingly difficult for the general practitioner to do justice to the subject of specific detailed diagnosis of the causes of allergy and its specific treatment, since the complicated methods of testing (exclusive of skin tests) and treatment require many peculiar details of knowledge and experience. The more obscure cases seem to drift totally beyond the realm of physicians who are interested only casually in the subject. For this reason, it is urged that the small number of physicians scattered throughout the country who are giving their time and thought to the development of this line of work be encouraged and supported in their efforts.

Kahn [1] reviewed the entire history of the knowledge of asthma in a most comprehensive way, and for a review, especially of the earlier writings on this subject, the reader is referred to his paper.

TERMINOLOGY

Kolmer [2] discussed at length the terminology and possible mechanisms involved in reactions which give rise to human symptoms such as hay-fever, asthma, urticaria, dermatoses, etc. His discussion is so condensed that it is impossible to review in an article so brief as this one. His ideas seem very sane and plausible, and strike the fundamental points of importance to physicians interested in this work. Kolmer stated that the large number of terms which had been introduced in this field, based on the finding, or failure to find, certain reactions in the cells or serums, are not justified because of the incomplete development of perfect laboratory methods for demonstrating or excluding such phenomena. He expressed the belief that too much emphasis has been placed on the results of animal experimentation in trying to elucidate human phenomena. He stated that the more highly sensitive human organism differs widely in its reaction from that of animal organisms. He believed that the hereditary state which gives rise to the possibility of the exaggerated reactions which are observed in patients with hay-fever and asthma is a result of a hyperirritable vasomotor system, and that this heredity is the cause of the unusual manifestations of reaction to certain agents in these patients. According to Kolmer, this heredity is the so-called "shock organ" of Coca, the existence of which he thinks is unproved. He prefers the term "allergy" to the terms "anaphylaxis, hypersensitiveness, idiosyncrasy or atrophy." He expressed the opinion that classifications should be based on what is known of the nature of the exciting agents rather than on the success or failure to demonstrate various antibodies in the blood, or on the success or failure of efforts to sensitize guinea-pigs or the skins of human beings. He approves of the terms "active" and "passive" sensitization, and also of the term "desensitization." The latter term, he thought useful for expressing the idea of decreasing symptoms under therapeutic intervention with increase in toleration for exciting agents, even though the exact mechanism of this effect is unknown. In all he suggested adherence to a more simple nomenclature until the various phenomena of heredity and immunity involved in these peculiar reactions become more clearly proved. He expressed the belief that the

1. Kahn, M. H.: History: Survey of Our Knowledge of Bronchial Asthma, M. Life **35**:109, 1928.

2. Kolmer, John A.: A Critical Review of the Mechanism and Terminology of Allergy, J. Lab. & Clin. Med. **13**:905, 1928.

term "allergy" is ample for designating the phenomena as a whole, and that the term "allergen" is useful for designating its wide variety of exciting agents, at least until a time when there is a means of discovering whether or not the mechanism of serum allergy in a guinea-pig is fundamentally the same as the serum allergy, hay-fever, asthma, etc., of human beings. Kolmer's paper is worthy of study.

EFFECTS OF ALLERGY

Rowe [3] made a very useful and readable contribution to the literature in discussing the rôle of allergy in the etiology of disease. He first dealt with allergy as a cause of abdominal disease. In discussion, I may say that this is worthy of the emphasis which he gives it because abdominal allergy is so commonly confused with functional and organic disease due to other causes. In fact, the condition is hardly recognized even today by the medical profession at large as a common cause of serious abdominal symptoms. Allergy should be brought more frequently to the attention of abdominal surgeons who often operate again and again in cases of this type, frequently each time under a different diagnosis, and frequently each time with less success. In the end they usually diagnose adhesions due, as they think, to their own operations.

Abdominal allergy simulates many abdominal disorders, but rarely simulates any of them perfectly, so that, as a rule, that disease can be suspected and positively diagnosed by physicians who have interested themselves in their work. Usually, it can be proved rather easily and rather definitely through the adequate use of epinephrine as a therapeutic test. Epinephrine, 0.25 cc., given subcutaneously every five minutes until a tremor of the hands appears, usually brings relief in uncomplicated cases. If this can be done, many useless and harmful operations ought to be avoided and many brilliant therapeutic results ought to be obtained by relatively simple means. The foregoing is perhaps equally true in relationship to diseases of the nose, larynx and bronchial tubes, although in these localities the disease is much more frequently looked for and proved. Laryngologists have told me that in the absence of gross anatomic defects in the nose, allergy is one of the most common causes of chronic nasal disease. Operative measures do not relieve the cause of diseases of this sort. Almost all physicians interested in allergy agree on this point, and I am sure that if this point of view is accepted by laryngologists, fewer errors in judgment will be made in the treatment of local nasal pathologic conditions. Rowe dealt well with the commonly known manifestations of allergy, such as urticaria,

3. Rowe, A. H.: The Rôle of Allergy in the Etiology of Disease, J. Lab. & Clin. Med. **13**:31, 1927.

angioneurotic edema, dermatoses, hay-fever and asthma, and in addition, spoke of allergy as a cause of headache and epileptiform seizures. He emphasized the advisability of a conservative attitude in regard to surgical measures in the treatment of allergic conditions. He stated that he had noticed in his experience, especially in the treatment of hay-fever and asthma, that "where surgery has been performed, especially when of an extensive nature, the phenomena of allergy have been more difficult to control." He said that "with marked congestion of the mucous membranes caused by sensitiveness combined with infection, he cannot imagine that surgery can be done without extension of the infected area." He also stated that "for the control of either hay-fever or asthma he can see no justification in cutting off turbinates or in straightening septums or in taking out tonsils before a thorough allergic study combined with indicated treatment has been tried."

Skin Symptoms.—Vaughan [4] emphasized the importance of allergy in relationship to the etiology of eczema. He stated that he has not convinced himself that all cases of eczema are associated with allergy, but that allergy comes nearer to being the common denominator which is being searched for in the study of eczema than does any other state which has ever been recognized. He stated that a patient sensitive to a given agent may be exposed to that agent repeatedly without the appearance of symptoms, but that in case his allergic balance is disturbed by a more intensive exposure, or by the coincident exposure to other agents to which he is less sensitive, severe symptoms may ensue. He expressed the belief that infection, endocrine disturbances, abnormal absorption from the alimentary tract, exhaustion and nervous reactions may precipitate an attack.

He omitted what I consider a most important primary or contributory cause of such disorders, namely, sensitiveness to heat and cold. When either so-called sensitive or nonsensitive patients are exposed to grades of heat or cold which they are unable to tolerate, they are likely to have skin reactions. If they are highly sensitive, this may result in severe dermatitis. Vaughan stated that whether or not allergy plays a part in the etiology of eczema, it is a most important and fundamental predisposing cause of the outbreaks. He pointed out that intracutaneous tests may be negative in cases of this sort and that scratch tests may be positive. He urged the importance of a broad scratch test rather than a narrow one. His experience in this line harmonizes exactly with my own. The fact is that the use of intracutaneous tests in my earlier work caused me to overlook the etiology in many such cases. Frequently

4. Vaughan, W. T.: Allergy in Relationship to Eczema, South. M. J. **17**:749, 1924.

eczema is caused by contact between some extrinsic substance and the surface of the skin. If the extrinsic substance is injected intracutaneously, contact between it and the surface is not obtained and the reaction may be negative because of failure to obtain adequate surface contact. The reader can convince himself of the importance of this fact, if in a case of proved ragweed dermatitis, he will apply a few pollen granules to a reacting surface. An area of eczema about the size of the head of a pin will appear at the site of each granule, and if many granules are applied, the areas will become confluent and give rise to a large ugly eczematous area. If a pollen solution, even a 5 per cent extract, is injected intracutaneously into the same patient, the reaction may be flatly negative.

In harmony with the foregoing work, which I believe is correct, Baagöe [5] stated that in an examination of 124 asthmatic children he obtained a history of skin symptoms in 60 per cent, prurigo in 29 per cent, urticaria in 27 per cent, pruritus in 11 per cent, local edema in 4 per cent and other skin infections in 4 per cent. The foregoing skin manifestations were characterized by attacks of hyperemia, edema and itching, almost always due to exposure to causative agents. He thought that these illnesses should be looked on as allergic diseases of the skin.

Epileptiform Convulsions.—Spangler,[6] in a study of patients with epilepsy, stated that of 100 consecutive adults having recurring convulsions, a history of allergy among the ancestors was obtained in 88 per cent of the cases, and in 54 per cent, allergic manifestations other than convulsions were disclosed by history or examination. Spangler stated that in patients predisposed to epileptic convulsions, a reaction of allergy might easily precipitate an epileptic attack. This statement cannot be subjected to reasonable question; however, the fact that his cases of epilepsy were primarily allergic in origin can be questioned on the basis of the fact that the patients did not respond as well to therapy with epinephrine during the attacks or in intervals between attacks as in the average case, of allergic asthma. It is difficult indeed in the study of an obscure symptom in a patient with allergy to discover whether a given symptom is primarily a reaction of allergy or whether it is a symptom of another disease brought to the surface through an added strain of an attack of allergy. Spangler's results hardly justify a differentiation between these two important modes of action of an allergen in an epileptic patient; in fact, from the tone of his paper, I do not believe he wished to express himself positively on this point.

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5. Baagöe: Asthma, Especially in Children, Klin. Wchnschr. **7**:507, 1928.

6. Spangler, R. H.: Non-Specific Protein Therapy in Sensitization Diseases, M. J. & Record **122**:317, 1925.

DIAGNOSIS

Nasal Diagnosis.—Eyermann,[7] in discussing the nasal manifestations of allergy, dealt at some length with the difficulties of recognition of the allergic case, stating that it may simulate nasal rhinitis, especially after nasal or paranasal infection is superimposed. This, he stated, obscures the typical allergic appearance of the membranes and secretions. He mentioned the well known fact that a family or personal history of classic manifestations of allergy other than those observed in the nose gives presumptive confirmatory evidence of the condition.

He also correctly stated that cutaneous tests are not infallible, and give positive reactions in only about 50 per cent of the cases. He dealt at some length with a description of the cytology of the nasal secretions, stating that he found eosinophils in considerable numbers in 72 per cent of the cases of allergic rhinitis, whereas, in nonallergic cases, only 3 per cent showed eosinophils, and even in this 3 per cent, they were relatively scarce.

Skin Tests.—As the development of the clinical phases of the phenomena of allergy has been largely carried on by Americans (probably as a result of a suggestion made by Meltzer), it is interesting to quote results obtained by foreign observers such as Baagöe of Kopenhagen. Baagöe made skin tests on many children for sensitiveness to foreign materials. Since children rarely show the high grade multiple skin sensitiveness observed frequently in adults, Baagöe's results harmonized fairly well with clinical observations. Physicians whose work is largely confined to children are inclined to be more optimistic concerning the value of skin tests than are physicians whose practice deals largely with adults. Baagöe tested a group of normal and a group of asthmatic children with fourteen substances. In the normal children, he found positive reactions in only 10 per cent. In contrast to this, he found positive tests in 71.9 per cent of asthmatic children. More than half reacted to more than one substance. In about half of the cases, the results obtained by skin tests harmonized with sensitiveness as determined by history and clinical tests. Several patients, however, showed negative skin tests to the agents which clinically caused illness. Hair and feathers were most frequently the cause of asthmatic attacks, while foods more frequently caused vomiting and skin eruptions. A rather large percentage were clinically relieved for from one to three years by removal of the agent to which they were highly sensitive. These results harmonize very well with the results obtained by Americans in the study of children. In the study of adults, however (if pollen cases are excluded), the results obtained by skin tests do not

7. Eyermann, C. H.: Nasal Manifestations of Allergy, Tr. Am. Laryng. Rhin. & Otol. Soc. **33**:477, 1927.

harmonize so often with clinical tests. In adults, skin tests cannot be given the weight in diagnosis which many are inclined to give them and which would be so desirable if dependable. The foregoing results, furthermore, are reported for the purpose of emphasizing again the fact that even in children skin tests are not always wholly dependable. Physicians who realize this are not so likely to be so disappointed in their results in the diagnosis and treatment of allergic diseases. More weight must be laid on a horse sense history, physical examination and clinical tests. The foregoing statements apply more to physicians who are interested in allergy as a side line than to those who devote most of their time and thought to a study of this interesting subject.

Coca and Milford [8] have improved their preparations of house dust extract and milk for skin testing. They found that through a process which they described dust extracts which are inert can be concentrated by evaporation at room temperature to one-tenth or even to one-twentieth their original volume, and in this form they more frequently give positive skin tests. They stated that they have also improved their milk preparations through removal of the casein by precipitation with rennet.

Lamson, Piness and Miller [9] stated that the skin tests are definitely reduced by pollen therapy; that a degree of lessened sensitivity, as shown by the result of testing, persists for at least four weeks after treatment, and that after prolonged treatment this period may be extended to many months, especially between pollen seasons. On the basis of this, they stated that the perennial treatment of the disease may in the end prove to be the best method for maintaining this condition.

The factors which seem to prevent desensitization, they felt, are probably related to differences between persons and to differences in the amount of treatment given. They make the important statement that each patient should be considered an individual problem.

ETIOLOGY AND PATHOGENESIS

Heredity.—Smith [10] reported an interesting study of allergy in five generations of one family. Among these he obtained a history of hay-fever, asthma, urticaria, angioneurotic edema or eczema in 56.2 per

8. Coca, A. F., and Milford, E. L.: Specific Hypersensitiveness: Additional Notes on Preparation of Fluid Extracts and Solutions for Use in Diagnosis and Treatment of Atopic Conditions, J. Immunol. **15**:1, 1928.

9. Lamson, R. W.; Piness, G., and Miller, H.: Pollen Allergy: Skin Reactions of Patient Before and After Treatment with Spring (Grass) Pollens, Am. J. M. Sc. **175**:791, 1927.

10. Smith, A. E.: Occurrence of Hypersensitiveness or Allergy in Five Generations of One Family, Arch. Int. Med. **41**:472 (April) 1928.

cent, whereas, among twenty-three controls not related to the family except by marriage, only one was allergic. He assumed that his survey further strengthens the statement that allergy is familial in distribution.

Experimental Food Sensitiveness.—Walzer and Walzer[11] have added to their already brilliant studies published in 1927. They demonstrated the fact that if the skin of a normal person is sensitized locally by a tiny injection of serum taken from a patient sensitive to a food, a wheal will appear at, or near the site of, the injection if the person eats the food to which the patient donating the serum is sensitive. In other words, if the serum of a patient sensitive to egg is injected intracutaneously into a normal person, the latter will develop a hive at the site of inoculation within one or two hours after the ingestion of egg. This reaction apparently appeared in all persons tested, and in some cases, the hive produced was as large as 5 cm. in diameter, even though the serum injected was no greater in quantity than 0.02 cc. This splendid research is most fundamental in its importance in relationship to the etiology of hives. It proves conclusively that a food taken by mouth can produce a hive in a locally sensitive area of skin in a normal person, even when taken in a most natural way. They stated, as a matter of interest, that two types of hives can be produced; namely, one type which involves only the area inoculated with an area directly surrounding it, and another type in which the wheal produced appears around the site of inoculation, but does not include the inoculated area.

The hives produced experimentally were typically the same as those so frequently observed clinically in patients with hives showing erythema itching and edema of different sizes and shapes. If, on the day after the subsidence of the wheal, the skin is irritated locally by scratching, wheal production of lesser intensity usually appears. Other results of interest in this connection showed that the eating of a food with marked hive production diminished its faculty for producing reactions at a later period. Hyperchlorhydria retarded the reactions while achlorhydria accelerated them. A passively sensitive area retained its sensitiveness for a number of weeks.

Passive Transfer.—Grove,[12] in a series of experiments on monkeys, was unable to passively transfer sensitiveness to the skin of monkeys through intracutaneous injections of serum from a sensitive person. She stated that the experiments suggest that monkeys lack the (so-called) atopic shock tissue which (unproved) must be assumed to be characteristic to the human species.

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11. Walzer, A., and Walzer, M.: Studies in Urticaria-Wheal Production Through Internal Channels, Am. J. M. Sc. **173**:279, 1927.

12. Grove, F.: Studies in Specific Hypersensitiveness: On Passive Transfer of Atopic Hypersensitiveness to Monkeys, Immunology **15**:3, 1928.

Heparin.—Clarke, Donnally and Coca [13] showed that the injection of heparin into sensitized animals, in amounts sufficient to prevent blood clotting for from twenty-four to forty-eight hours or longer, reduced or prevented the appearance of the anaphylactic syndrome in nine of thirteen sensitized guinea-pigs.

Intestinal Parasites.—Brunner,[14] in testing persons of different ages with saline extracts of *Ascaris, Dibothryocephalus* and *Taenia solium,* found that reactions were elicited similar to those found in atopic hypersensitiveness (cases of hay-fever and asthma) in infested patients. Of fifty-three persons presenting marked reactions, 40 per cent showed positive signs of parasites in the stools. *Dibothryocephalus* was found in only one of 309 cases in which negative reactions occurred. Brunner stated that testing with ascaris antigen gives positive reactions in patients affected with other members of the nematode group, so that testing with this extract was sufficient for the diagnosis of nematode infection.

He thought that the specificity of *Dibothryocephalus latus* and *Taenia solium* reactions was demonstrated. Sensitiveness was transferred from infected patients by the intracutaneous injection of serum into normal persons, and in three asthmatic patients constitutional reactions were observed after the use of ascaris extract in testing. He considered that a marked positive reaction indicates either the presence of parasites or recent infestation.

Castor Bean Epidemic.—Figley and Elrod [15] reported what almost might be called an epidemic of asthma caused by sensitiveness to powdered castor bean dust in a neighborhood near a castor bean mill. Figley stated that thirty cases were known to have been caused by the inhalation of finely powdered castor bean dust, and that this was probably the cause of fifty-five additional cases in which the patients were reported suffering from the same condition.

Autopsy Study.—Steinberg [16] added a careful study of two cases to the scant number of autopsies reported on asthmatic persons. A differentiation was made between the pathologic changes which occur as a direct result of the allergic state and as a result of superimposed bacterial

13. Clarke, J. A., Jr.; Donnally, H. H., and Coca, A. F.: Studies in Specific Hypersensitiveness; on Influence of Hereditary in Atopy, J. Immunol. **15**:9, 1928.

14. Brunner, Matthew: Immunological Studies in Human Parasitic Infectation: Intradermal Testing with Parasitic Extracts as an Aid in the Diagnosis of Parasitic Infectation, Immunology **15**:83, 1928.

15. Figley, K. D., and Elrod, R. H.: Endemic Asthma Due to Castor Bean Dust, J. A. M. A. **90**:79 (Jan. 14) 1928.

16. Steinberg, B., and Figley, K. D.: Pathology of Asthma: Nonbacterial Allergic and Bacterial Types Based on Autopsy Material, J. Lab. & Clin. Med. **13**:921, 1928.

infection. He stated that the emphysema which has been attributed partly to bronchoconstriction and partly to edema of the bronchial membranes is due also, in part at least, to the accumulation of bronchial secretion, which cannot be expelled. He thought that the damming back of bronchial secretion is partly responsible for degenerative changes found in the mucous glands. Hypertrophy of the muscular layer of the bronchii was a constant occurrence in autopsies performed by him and in the autopsies previously reported by other observers. This hypertrophy has been assumed to be a result of spasmotic contractions. Steinberg believed that it is due, in part at least, to frequent contractions for the purpose of expelling foreign material. He thought that it is analogous to cardiac hypertrophy compensating for additional loads. These views and constant observations are worthy of more than passing interest. They strike at the fundamentals of the pathogenesis of

Sum Total of Daily Pollen Counts *

Kansas City, 1927, Downtown:		Kansas City, 1927, Suburbs:	
Elm	3,435	Ragweeds	27,012
Box elder	376	Grand total	46,158
Ash	1,737	Kansas City, 1926, Suburbs:	
Oak	3,924	Ragweeds	35,782
Walnut	1,081	Indianapolis, 1926:	
Bluegrass and orchard	1,148	Ragweeds	37,618
Timothy and redtop	1,180	Oklahoma City, 1926:	
Ragweeds (all species)	22,270	Ragweeds	141,465
Miscellaneous	6,492	Chicago, 1925:	
Grand total	41,643	Ragweeds	6,038

* Total number of pollen granules which fell on $\frac{55}{100}$ square inch of surface during the year 1927 in Kansas City downtown district and in the suburbs and in other cities.

perennial bronchial asthma, for if the hypertrophy is a useless result of chronic spasm of the muscles, certain it is that the more frequent and prolonged the attacks, the more marked will be the tendency to tight constriction in chronic perennial cases. If the hypertrophy, however, is useful in expelling mucus, the previous statement might not apply.

Steinberg also found edema and cellular infiltration in the bronchial walls. Many of the cells were eosinophils. In the case which he considered bacterial asthma, he found evidence of chronic bronchitis with superimposed acute bronchitis. He also demonstrated in this case, bacterial emboli in the vessels of the brain, acute nephritis and central hemorrhagic necrosis in the liver which he thought pointed to the entrance of bacteria into the blood stream.

Pollen Study.—A study of the pollen content of the air is suggested as useful, in fact, almost essential to physicians interested in allergy. The following charts, reported by Durham and myself, are given here in detail for the purpose of illustrating the marked variation in the pollen content of the air at different seasons and in different districts.

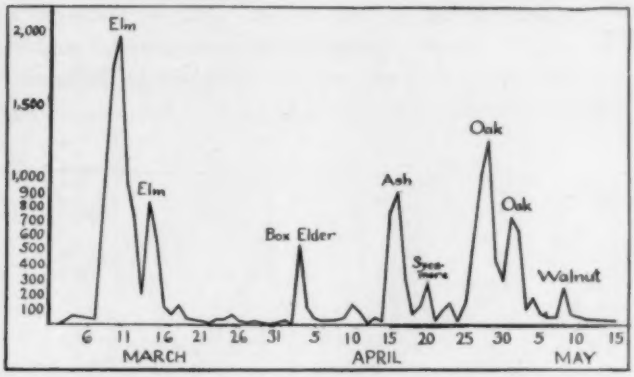

Chart 1.—Tree season, 1927, Kansas City, Mo., illustrating the tremendous variation in the pollen content of air throughout the year.

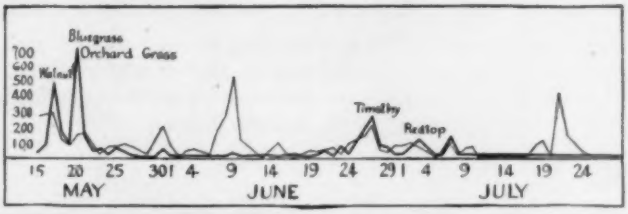

Chart 2.—Grass season, 1927, Kansas City, Mo., showing the tremendous variation in the pollen content of the air throughout the year. The heavy line indicates the pollen; the light line, spores.

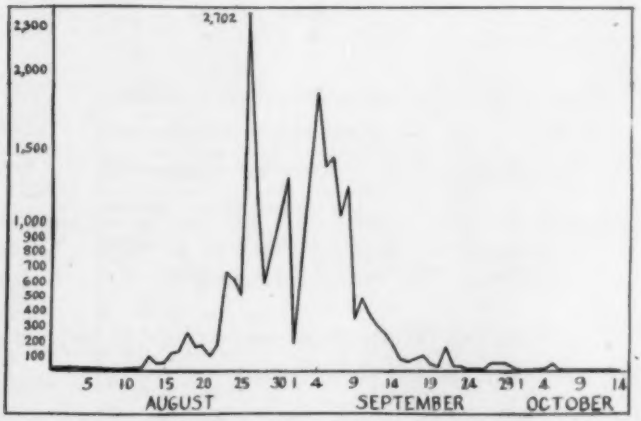

Chart 3.—Ragweed season, 1927, Kansas City, Mo., showing the tremendous variation in the pollen content of the air throughout the year.

Durham's [17] comparison of pollen counts in different districts is instructive but misleading in one respect, that is, averages are shown rather than peaks. Even a most casual observer can understand that the pollen problem in an area such as Virginia is different from the pollen problem in an area such as Oklahoma. These variations no doubt

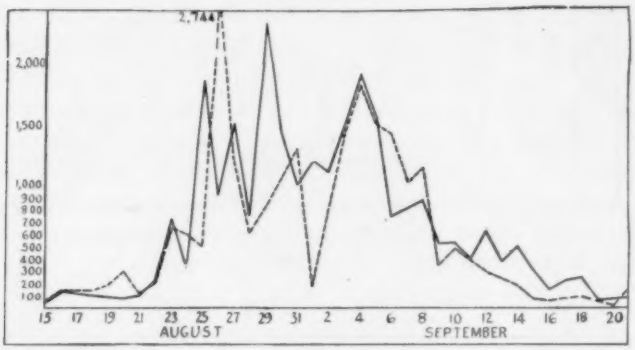

Chart 4.—Ragweed season, Kansas City, Mo., showing marked variation in the pollen content of the air on the same days in the suburbs of Kansas City and in the business district: The solid line indicates the counts made in the suburbs; the broken line, the counts made in the business district.

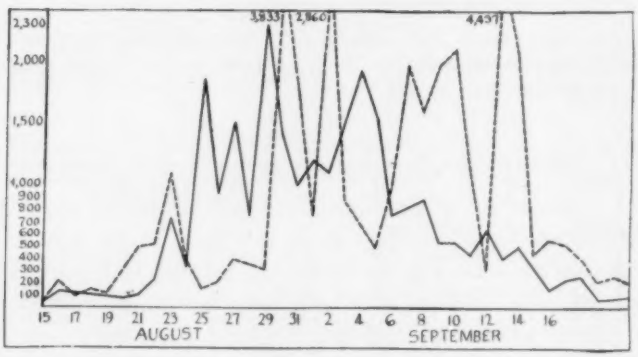

Chart 5.—Ragweed season, Kansas City, Mo., showing the tremendous variation of the pollen content of the air during different years. The broken line represents Kansas City in 1926; the solid line, in 1927.

account for some of the differences in the behavior of asthmatic patients which are commonly attributed to change in climate.

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17. Duke, W. W., and Durham, O. C.: Pollen Content of the Air (Relationship to the Symptoms and Treatment of Hay-Fever, Asthma, and Eczema), J. A. M. A. **90**:1529 (May 12) 1928. Durham, O. C.: The Contribution of Air Analysis to the Study of Allergy, J. Lab. & Clin. Med. **13**:967, 1928.

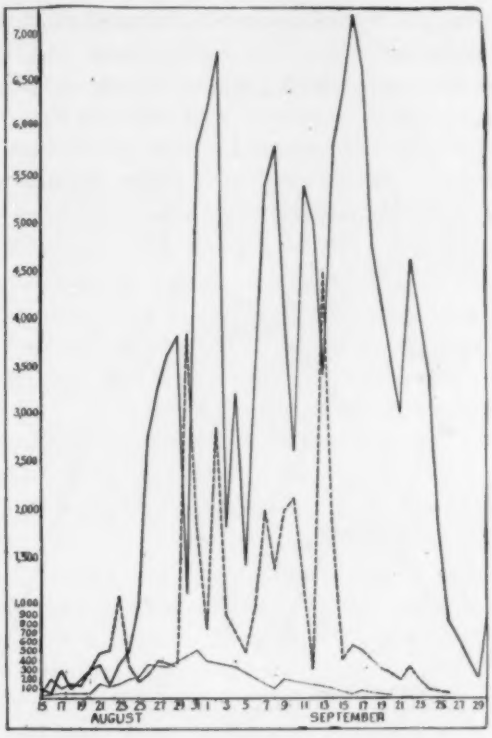

Chart 6.—Ragweed season; tremendous variation of pollen content of the air in Chicago (peak 500), Kansas City (peak 4,500) and Oklahoma City (peak 7,200). The solid line indicates Oklahoma, 1926; the broken line, Kansas City, 1926 and the dotted line, Chicago, 1925.

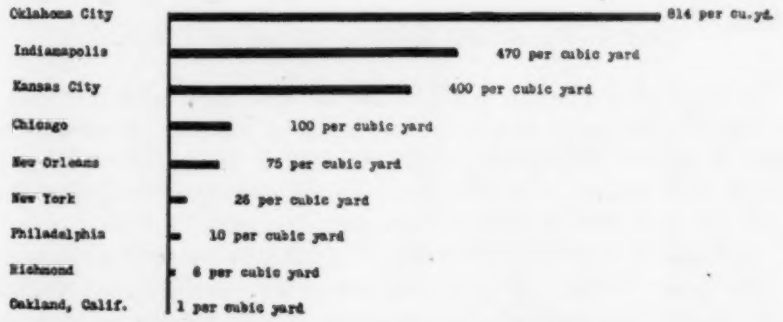

Chart 7.—Comparison of daily average ragweed pollen concentration.

Antitoxin Study.—Young reported a study in which a comparison was made between 100 persons who had received toxin antitoxin as a prophylactic, and in more than 100 persons who had not received it. He did not find any appreciable difference in the reactions following further injections of serum in those who had had toxin antitoxin and in those who had not. He concluded that toxin antitoxin does not sensitize the average person, so that further inoculation with horse serum antitoxin would be dangerous.

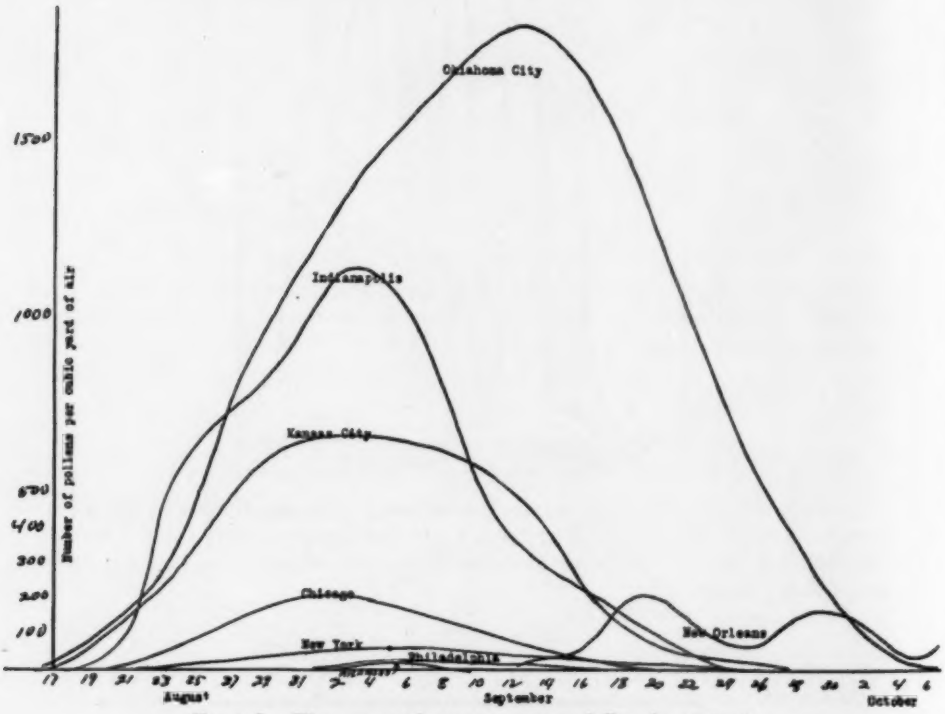

Chart 8.—The ragweed season; mean daily air content.

Spicer,[18] after a similar study, drew the same conclusion and stated that inoculations with serums do not seem to influence markedly the effect of further administrations of serum, and that almost as large a proportion of reactions occur in patients who have not received previous injections as in those who have been treated previously.

It would be interesting if a similar study were made in patients of allergic strain in whom, I believe, the use of a minute quantity of horse serum in a toxin antitoxin mixture might not behave in such an indifferent manner.

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18. Spicer, J.: Effect of Previous Administration of Antitoxin and Toxin-antitoxin on Serum Reaction, J. A. M. A. **90**:1778 (June 2) 1928.

Physical Sensitiveness (Heat and Cold).—I [19] have reported briefly on the subnormal and unstable temperature of the perennial asthmatic patient. A large proportion of patients with temperatures of this type are sensitive to heat and cold, and many of them are sensitive only to heat or to cold. They often do not react to other agents which can be detected by either skin tests or clinical tests, or by other methods of study at one's disposal. Symptoms can be reproduced in many such patients by the suitable application of heat and cold, and can be relieved by similar applications made in the reverse way. Patients who are sensitive to an increase in body heat react usually to the heat produced by mental or physical exertion and to agents which prevent the loss of body heat, such as too much clothing or warm moist air. The reverse type, that is, patients who are sensitive to body cold are made better by the same factors which cause trouble in the heat sensitive type. The situation is complicated by the fact that some patients who are sensitive to body heat react most markedly to heat after exposure to cold, and vice versa, patients sensitive to cold react most markedly to cold after previous exposure to heat, so that some persons who are sensitive to heat have their most marked reactions in the winter, and those sensitive to cold have their most marked reactions in the summer. As a typical example of the former may be mentioned the patients sensitive to heat who react after marked exposure to cold weather or cold water, but only after getting away from the cold and entering a warm room or on exercise. And vice versa, those persons sensitive to cold may have their most marked symptoms after exercise in the summer, but only when they sit down under the shade of a tree or in front of a fan and cool off. Many persons react seasonally, that is, persons sensitive to body heat, react to the first warm days of spring or summer after the prolonged exposure to winter cold, and vice versa, those sensitive to body cold react to the first cold days of fall or winter after prolonged exposure to summer heat. Prolonged exposure in these types of persons actually seems to unfit them for the opposite exposure, that is, persons sensitive to heat are unfitted for summer heat by the prolonged cold of winter and persons sensitive to cold are unfitted for winter by the prolonged heat of summer. Many persons who are sensitive to cold gain tolerance for cold in winter and those who are sensitive to heat gain tolerance for heat in summer, so that toward the middle or end of a season their symptoms often yield. This explains in part the well known good or bad effect of certain climates on certain persons with perennial allergy. This last statement does not by any means apply to all cases

19. Duke, W. W.: Subnormal Temperature in the Perennial Asthmatic Patient, J. Lab. & Clin. Med. **13**:1010, 1928.

of perennial allergy, for some persons have their troubles at the peaks of the season. One person sensitive to heat who came to Kansas City from San Francisco went home without examination because of the temperature. She could not tolerate the heat without the appearance of dermatitis and systemic illness.

The situation is still further complicated by the fact that a rather large proportion of persons are sensitive to the combined simultaneous effect of heat and cold, that is, heat in one location and cold in the other. Some patients are sensitive to body heat while breathing cold air. These patients react markedly to the effect of exercise in the winter and tolerate better a certain amount of exercise during the hot months. The opposite type react to body cold which is most marked when they are breathing warm air or moist air. (It must be borne in mind that moist air to the bronchial tree is warm air because of the loss of the cooling effect of evaporation on the surface membranes.) Patients with this kind of sensitiveness on humid days cannot stand the effect of a draft on the skin or a cold bath, and, in case they have asthma, are frequently benefitted rather than made worse by the effect of exercise when the air is moist or hot. It was suggested that the peculiar reactions of this type were due to some damage to the heat regulating mechanism. It is well known that under normal conditions body temperature is regulated partly through an increase or a reduction in the elaboration of body heat and partly through an increase or decrease in the loss of body heat by an increased or reduced state of dilatation of the skin vessels and capillaries, and also of the capillaries of the nasal and bronchial mucous membrane. Capillary dilatation in these localities brings an increased amount of blood to the surface and aids in cooling, whereas, contraction of the vessels of the bronchial or nasal membranes or skin keeps a larger quantity of blood internal, and thereby tends to reduce the loss of body heat. It was suggested that in persons sensitive to heat and cold the heat regulating mechanism, on account of an injury caused by a febrile disease or some other disease, does not act perfectly so that explosive efforts at regulating body heat are made. If a person with this injury happens to be one of atopic diathesis (of the hay-fever and asthma family), the imperfect reaction is exaggerated so that instead of constructive reactions, a harmful reaction occurs resulting not only in excessive capillary dilatation with itching, irritation and edema, but also with anomalies in the secretion of evaporating fluids which aid in surface cooling. This is firmly believed to be one important cause of so-called vasomotor rhinitis and asthma. Relief can be given in many such cases by constructive advice and patience on the part of the physician. Again, an increase in tolerance should be advised rather than avoidance in mild cases. In severe cases and in elderly people,

avoidance seems the most practical solution. Bear in mind that moist air is warm air to moist surfaces and cold to dry surfaces from which heat is lost by radiation.

Light.—Light sensitiveness is interesting in relationship not only to diseases of the nose but to diseases of the eye. Photophobia is nothing more nor less than light sensitiveness. It was observed in two patients reported previously by me that slight exposure of the eye to light not only gave rise to pain, but to temporary blindness. Furthermore, I have observed three patients in whom definite symptoms resembling allergy, such as sneezing, swelling and watery secretion from the nasal membranes followed the exposure of the retina to sun light.

Animals can be sensitized to light through the subcutaneous or intravenous injection of certain stains, and, more interesting still, through the intravenous injection of a derivative of blood pigment known as hematoporphyrin. White animals who feed on buckwheat and several other cereals occasionally become so sensitive to light that natural exposure to light in nature results in an illness or in death of the animal.

In this relationship, a report of Smetana [20] is interesting. He fed white mice on hematoporphyrin for considerable periods of time without their developing light sensitiveness. Evidently the hematoporphyrin was not absorbed. Albino mice, sensitized to light by the injection of hematoporphyrin, were protected from the ill effect of light by the injection of certain stains. The writer assumed that the pigment filtered off damaging rays of light in a purely physical way, and protected the animals from their effect.

The intestines and mesentery of a sensitized cat were exposed to light while under anesthesia with a rapidly fatal issue.

White mice were given injections of large quantities of blood taken from guinea-pigs in shock caused by an injection of hematoporphyrin followed by exposure to sunlight. The serum did not produce symptoms of shock in the white mice. In two animals whose circulation was connected together by arteriovenous anastomosis and treated with hematoporphyrin, exposure of one of the animals resulted fatally. The unexposed animal, however, showed no apparent ill effect, even though his circulating blood was intimately mixed with that of the exposed animal.

The blood in vitro of an animal treated with hematoporphyrin was exposed to light carried out by allowing the blood of the animal to pass through a quartz cannula anastomosed in a vein through which was passed light. This did not affect the animal.

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20. Smetana, H.: Physiological Action of Hematoporphyrin, J. Exper. Med. **47**:593, 1928.

These results harmonize well with the clinical phase of the subject, which suggests that in a case of sensitive persons who react to physical agents, the sensitizing agents reside in the tissue cells rather than in the circulating blood. I was unable to passively transfer physical sensitiveness from one to another either by the method of Proeusnitz and Kuster or by transfusion.

Drug Reactions.—Hanzlik, De Eds, Empey and Farr [21] studied the effect of agents which when injected intravenously frequently produce anaphylactoid reactions—such agents, for example, as copper, arsphenamine, peptone, acacia, agar and toxified serum. These agents were tested in vitro on the blood plasma of different species of animals and were used in concentrations which corresponded to those which would give rise to the anaphylactoid reactions in animals.

The most important change that was found was a uniform, though variable lowering of surface tension. The most effective lowering agent was copper sulphate. This was also the most effective agent for eliciting anaphylactoid reactions in animals. There was only a general increase in the albumin globulin ratio regardless of the nature of the agent used. Changes in viscosity were unimportant, except for acacia, agar and peptone, which gave rise to consistent increases. Total cholesterol was unchanged. Sedimentation rate was increased by acacia and gelatin. These agents also protected the corpuscles in a fragility test. Arsphenamine and copper sulphate seemed to increase fragility. The authors thought that the results of the different tests agree with an idea that direct contact between the blood and foreign agents, when used intravenously, cause anaphylactoid reactions, and that they do so through a disturbance in the blood colloid equilibrium. They believed that changes of this sort are fundamentally concerned in the functional disturbances of allergic phenomena in general.

TREATMENT

Results.—Further careful clinical statements by Rackemann,[22] based on a study of 213 cases picked out of a total of 1,074 cases in which the patients were completely relieved symptomatically for a period of more than two years, are summarized as follows:

The most common method of cure is by elimination or escape from the particular substances to which the patient is hypersensitive and which is the exciting trigger mechanism and starts asthmatic attacks.

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21. Hanzlik, P. J.; De Eds, F.; Empey, L. W., and Farr, W. H.: Hemoclastic Changes in Vitro from Agents Causing Anaphylactoid Reactions, J. Pharmacol. & Exper. Therap. **32**:273, 1928.

22. Rackemann, F. M.: Analysis of 213 Cases in Which Patients Were Relieved for More Than Two Years, Arch. Int. Med. **41**:346 (March) 1928.

Rachemann stated that in some cases (especially in children) the removal of the trigger mechanism can result in a cure, but in most of the cases the extent of the "cure" cannot be determined. He stated that clinical "cure" can exist in the presence of the offending substance in spite of the fact that reactions to skin tests may remain positive. Apparent "cures" following changes in environment are often permanent. It is important to emphasize his statement that the removal of foci of infection leads to clinical cure in only a few cases, and that similar procedures do not help other patients who may later be cured by other means. He emphasized the fact that correction of hygiene and treatment based on the common sense practice of medicine is always important, especially in children who may tend to outgrow asthma. He stated that the tendency to outgrow asthma can be assisted by good management as early as possible. He also made the important statement that the asthmatic attack seems to be based on immunologic anomalies rather than on physiologic or anatomic defects.

Menagh [23] made a thorough study of 260 cases of urticaria and angioneurotic edema. As a result of his studies, he thought that these disorders could be considered allergic phenomena. He thought that in 30 per cent of the series, the etiologic factors were the absorption of food and other foreign materials from the alimentary tract. In a group comprising 48.8 per cent of cases, disorder of the biliary tract was considered an important factor in the etiology of the disease, in fact, no other etiologic factor was found.

It goes without saying that statistics such as the foregoing would only apply to the condition in adults since in children and young adults this possible source of the disease would be rare. Treatment in the group of persons in which the condition was considered biliary in origin was directed conservatively toward the improvement of the biliary tract through regulating the diet and the bowel movement, the administration of bile salts and nonoperative drainage with a tube. Autogenous vaccines were administered, but they were believed to be valuable only when other methods of treatment preceded or accompanied them. It is interesting to know that the author stated that surgical measures did not contribute a great deal in the treatment in these cases, and that he believed that cholangeitis is more commonly associated with the type of absorption which gives rise to urticaria than is cholecystitis. He stated that of the cases in which the results of treatment could be followed, 45.2 per cent showed relief, 38.6 per cent were improved and 16.3 per cent were unimproved.

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23. Menagh, F. R.: Etiology and Results of Treatment in Angioneurotic Edema and Urticaria, J. A. M. A. **90**:668 (March 3) 1928.

Specific Treatment.—Walker [24] reported a review of 100 cases of pollen hay-fever in which he believed the patients were permanently cured. All remained symptom-free for a period of two years, seventy-eight for a period of three years or more without treatment; in twenty-two a marked positive skin test was changed to negative, and in twenty-two reduced to a doubtful reaction. In three cases, skin tests were obtained only by the use of undiluted pollen, and in nine additional cases, positive tests were obtained with concentrated pollen solutions only. In forty-four cases, the skin tests were not markedly changed. The patients had been treated at weekly intervals from a period of from thirteen to sixteen weeks prior to the usual onset of the symptoms.

Walker stated that when the pollen tests become negative, it seems safe to stop the treatment for hay-fever. In patients in whom pollen tests do not become negative, it seems desirable that at least one season, and preferably two seasons, of complete freedom from hay-fever should be experienced before treatment is discontinued.

Feinberg [25] expressed the belief that the maximum results can be obtained in the treatment of asthma by an individualization in dosage, a careful determination of the species of pollen which should be used in each case, and in the careful preservation of the potency of the pollen solutions which are used.

Black [26] reported further on the result obtained by the oral administration of pollen in therapy, and concluded that while the oral treatment possesses certain advantages, it does not give, as a rule, such satisfactory protection as treatment by parenteral injection.

Brown found that treatment of a person sensitive to pollen with one extract, for example, ragweed extract, does not give tolerance in the same person for an additional sensitiveness to another pollen, for example, timothy. Patients given a high grade tolerance for ragweed reacted to timothy pollen both on clinical exposure and on injections with a relatively small quantity of timothy extract.

Vander Veer, Cooke and Spain [27] gave a comprehensive report of their study of the diagnosis and treatment of seasonal hay-fever summarizing their entire experiences since previous communications made by Cooke in 1915-1916. They reported a botanical survey made with the cooperation of Professor Hodgson. They confirmed a previous state-

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24. Walker, I. C.: Therapy, One Hundred Cases of Apparently Cured Pollen Hay-Fever, J. A. M. A. **90**:750 (March 10) 1928.

25. Feinberg, S. M.: Hay-Fever Treatment: Factors Leading to Maximum Results, Clin. Med. & Surg. **35**:309, 1928.

26. Black, J. H.: Therapy, Oral Administration of Pollen: Clinical Report, J. Lab. & Clin. Med. **13**:709, 1928.

27. Vander Veer, Jr., A.; Cooke, R. A., and Spain, W. C.: Diagnosis and Treatment of Seasonal Hay-Fever, Am. J. M. Sc. **174**:101, 1927.

ment of Cooke's that treatment with one type of pollen will protect against other pollens which may differ botanically, but which may be biologically similar. For example, treatment with one of the grass pollens will protect against several closely related grasses, and likewise, treatment with one of the ragweed pollens will protect against several varieties of ragweed. This they found to hold for some of the tree pollens, such as the birches, oaks and hickories. The rule only held true for closely related species of the same genius. They stated that one could not expect to immunize against sensitiveness to birch pollen with an extract of oak pollen, nor against plantin by using an extract of ragweed.

They continue to use Coca's solution in making extracts, stating that such extracts keep well in the icebox for a year. They use the extract in both diagnosis and treatment and try to standardize according to the nitrogen content of the solution. They test for sensitiveness with solutions of varying dilution, and state, whereas it is difficult to determine the degree of sensitiveness by this means, they still believe that the more sensitive the case, the smaller will be the dose required to keep the patient free from symptoms, and the more apt the patient will be to develop constitutional reaction under treatment.

They stated that prophylactic treatment is the treatment of choice and should be started, if possible, ten weeks before the season opens, injections being given at intervals of from four to seven days. The maximum dose should be reached just before the season begins and should be repeated at intervals of from five to seven days until the pollen disappears from the air. As a rule, about twenty injections are required.

Although they do not approve of coseasonal treatment when prophylactic preseasonal treatment can be given, they use it. They stated that though the results are less satisfactory, the discomfort can often be materially reduced by it.

They do not approve of the short interval method of treatment used and described by me because they believe that it is illogical and that the results obtained are not so good; they also believe in an increased liability to constitutional reaction when injections are given too closely together.

I may say, that I am by no means convinced that treatment with pollen should be given according to any method by physicians inexperienced in this line of therapy. Treatment according to many plans is reasonably safe with physicians who are accustomed to the intricacies of pollen therapy. The long interval method of treatment almost deprives patients living in smaller towns of pollen therapy since few can move to another locality for a ten weeks series of treatments, and few physicians residing in smaller localities are adequately experienced in the administration of pollen extract to carry it out with safety

and maximum benefit to the patient. This appears, therefore, to be a fundamental point in pollen therapy which urgently needs discussion.

Vander Veer, Cooke and Spain stated that constitutional reactions appear in about 10 per cent of all patients treated and follow less than 1 per cent of all injections given. Patients who are prone to develop reactions should be treated with special care.

These authors make the important statement that among their patients, some of whom have been treated for fifteen years, they have not seen any evidence of functional or organic disturbance which could conceivably be traced to the inoculations other than the specific reactions mentioned. They stated that it is easier to procure a good result in cases in the spring than later because the patients are exposed to a smaller amount of pollen and for a shorter period of time. Early cases require smaller doses of extract than later cases. Of the patients with spring cases treated in 1926, 90 per cent gave satisfactory results, as compared with 84 per cent for the general average of late patients with hay-fever which occurred later in the year.

Their percentage of cure in cases of pollen asthma is rather opposed to, and strikingly at variance with, my own, in that apparently smaller success was obtained in the asthma than in the hay-fever. Pollen asthma has been much easier to control in my hands than pollen hay-fever. Vander Veer, Cooke and Spain stated that 30 per cent of their patients who had pollen hay-fever also had pollen asthma. Seventy-five per cent of their patients with pollen asthma were relieved by the injections, while 25 per cent continued to have asthma in greater or less degree.

They stated that many patients successfully immunized for one year will carry over partial or complete immunity for the next one or two years; a few remain well indefinitely, but a majority gradually return to their former condition. They stated also that it was their belief that children who have had the disease a short time stand a better chance for permanent cure after two or three years' treatment than adults who have suffered for many years. These statements seem to harmonize with the experience of other unprejudiced writers.

Epinephrine.—I [28] have given a brief report on the use and abuse of epinephrine, stating that frequently this drug is given in stupenduous doses, often in such enormous amounts as 3 or 4 ounces (93.3 or 124.4 Gm.) in twenty-four hours. In two patients who had used epinephrine in large doses one or several times daily for many years, this had resulted in intense pigmentation of the skin and a deplorable physical condition. The patients were brown, emaciated and nervous in

28. Duke, W. W.: Chronic Use of Adrenalin in the Treatment of Asthma, J. Lab. & Clin. Med. **13**:1012, 1928.

high degree. The use of epinephrine in such quantities as this is purposeless and harmful and ought to be avoided. It seems questionable whether or not the prolonged use of the drug given one or several times a day in optimum doses is beneficial or harmful to the patient. It was stated that the quantity of epinephrine consumed by the average chronic user could be reduced almost always through attention to the primary factors which cause asthma, and that a useful substitute for the enormous doses could be found in the administration of from 10 to 15 grains (0.65 to 0.972 Gm.) of acetylsalicylic acid combined with adequate amounts of whisky—from ½ to 1½ ounces (15 to 45 cc.), taken preferably in the incipiency of attacks. The latter medication in my hands has been frequently as effective as morphine and presents a great advantage over the contraindicated morphine in the fact that it is not habit producing if used conservatively.

In a discussion of this question by the American Association for the Study of Allergy, the idea was expressed that the ill effect of epinephrine used intelligently by patient or physician was easily offset by the relief experienced through its use, and that the prolonged use of the drug does not seem to have any gross ill effect if given in optimum doses and at optimum intervals. The weight of opinion disapproved the use of morphine on the grounds that while effective in cases of asthma, it is dangerous because of the tendency to habit production, and is rarely needed in cases intelligently handled by other agents at one's disposal. It seemed from the discussion that a majority of physicians busy in this line of practice rarely find it necessary to use morphine.

Lilienthal's Method.[29]—Perhaps the most useful practical observation summarized in this review is that of Lilienthal who reported that massage of the site of inoculation of a hypodermic injection of epinephrine apparently causes additional absorption of the drug and often has the same therapeutic effect as that of a fresh injection.

In his paper, he stated that his report was based on an observation of Luckhardt and Coppanye who found, in animals treated with epinephrine hydrochloride, that massage of the injected site would give rise to an increase in blood pressure of from 15 to 180 mm. of mercury in from fifteen to seventeen seconds. This was followed by a return of pressure to normal within ten or fifteen minutes. If massage was immediately repeated, weakened response appeared, but after a rest of one-half hour or more, the response was again almost or as pronounced as it was directly after the original injection. It was assumed that epinephrine remained at the site of inoculation for as long a period of time as the

29. Lilienthal, H.: Epinephrine: Method of Prolonging Its Effect, J. A. M. A. **90**:1192 (April 14) 1928.

massage test was positive. It seemed to Lilienthal that this phenomenon might be used in the treatment of asthma. In his first case, he injected 0.3 cc. of epinephrine solution (1:1000) subcutaneously in a patient with asthma. For a period of forty-eight hours this patient was able to relieve the asthma by massage of the deltoid region at the site of this inoculation. The experiment was repeated several times. In a second case, he found not only that asthma was relieved by massage of areas into which epinephrine was injected, but that a rise in blood pressure accompanied it. He made similar observations on other patients, and in one patient with shock following an abdominal operation, he found that both the use of epinephrine subcutaneously and its subsequent massage produced a rise in pressure of ten points.

Balyeat,[30] in discussing the use of epinephrine, stated that it should not be used in aqueous solution or otherwise locally on mucous membranes because of the secondary vasomotor dilatory effect which follows and makes conditions worse, especially if repeated at daily intervals. He verified Lilienthal's observation that massage at the site of an inoculation of epinephrine will frequently give rise to the same relief as the original inoculation.

Intracutaneous Epinephrine.—Pilcher [31] studied the effect of the intracutaneous injection of epinephrine in children and found that it was usually followed more promptly by the systemic effects of the drug, and that the action was much more pronounced than when the same quantity was administered either subcutaneously or intramuscularly. He believed that the increased effect is due to a more rapid rate of absorption. The latter view is explainable, he believed, through the considerable amount of pressure which has to be used in making an intradermal injection, and because of this the solutions get into the venous and lymph channels more readily.

Multiple Injections of Epinephrine.—I have observed (to be reported subsequently) that epinephrine injected into many areas is more rapidly and intensively effective than the same volume injected in one locality. This is reported because of its possible usefulness to physicians who wish a rapid effect of the drug and who do not wish to give a patient the jolt of an intravenous injection.

Local Injection of Epinephrine in the Treatment of Pollen and Serum Reactions.—For the treatment of reactions following the use of pollen and other substances in therapy (to be published) and following the use of therapeutic serums, it is advised that physicians inject

30. Balyeat, R. M.: Clinical Use of Epinephrine in Allergic Diseases, J. Lab. & Clin. Med. **13**:1019, 1928.

31. Pilcher, J. D.: The Effects of the Intracutaneous Injection of Epinephrine in Children, J. Lab. & Clin. Med. **13**:201, 1927.

epinephrine into many areas around, under and over the site of inoculation of the agent used. This has a two-fold effect—first, in constricting the vessels around such an area so that no more of the agent is absorbed for a time. In addition to this, it has the effect of a rapid and potent application of epinephrine for the treatment of the patient. This medication is urged by me because of its practical usefulness to physicians who get into trouble. The slowed absorption may have the disadvantage of allowing a second or even a third reaction one or several hours after the original injection. One could conceive of the advisability of excision of an injected area.

In the treatment of the same condition, Cooke advised an injection of epinephrine above the injected area; the application of a tourniquet around the arm above the site of a serum or pollen shot to prevent further distribution of the agent to the body, and simultaneously an intravenous or subcutaneous injection of epinephrine. Both these methods of therapy should be borne in mind by physicians, and horse sense should be used in their application. Cooke's method of treatment can be recommended, especially in the more severe cases.

Salicylates.—Several isolated papers on the usefulness of acetylsalicylate in the treatment of allergic conditions, especially asthma, have been rather sadly overlooked by the medical profession. The intelligent continued employment of acetylsalicylate continued through the night hours ranks second to very few symptomatic therapeutic agents at one's disposal at the present time. It must, of course, be avoided in the rather large number of allergic persons who appear to be sensitive to acetylsalicylate, and its use in therapy should always be preceded by questions concerning sensitiveness or illness following the taking of acetylsalicylic acid. A brief history of this sort will serve to prevent many attacks of asthma and hives in persons sensitive to acetylsalicylic acid. Derick, Hitchcock and Swift [32] stated that if they use neocinchophen or acetylsalicylic acid in adequate dosage throughout the usual period of serum disease, the appearance of arthritic manifestations is prevented even though other manifestations of the illness may not be effected. They stated that the serum of patients treated in this manner usually fails to contain antihorse serum precipitin, or contains it in amounts far below the content which is observed in patients who show the arthritis.

Calcium and Phosphorus.—From a study of the blood calcium and phosphorus in hay-fever, asthma and other allied diseases, Sterling [33]

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32. Derick, C. L.; Hitchcock, C. H., and Swift, H. F.: Effect of Anti-Rheumatic Drugs on Arthritis and Immune Body Production in Serum Disease, J. Clin. Investigation **5**:427, 1928.

33. Sterling, Alexander: The Value of Phosphorus and Calcium in Asthma, Hay-Fever and Allied Diseases, J. Lab. & Clin. Med. **13**:997, 1928.

reported that while calcium reduction is not often definite, phosphorus reduction is frequently definite, in fact, occasionally to such an extent that it can hardly be quantitated on chemical analysis. He stated that therapy with calcium is beneficial in some cases and that therapy with phosphorus is often beneficial, in fact, he stated that through the use of phosphorus and calcium therapy in conjunction with specific desensitization, he has been able to relieve practically 100 per cent of his patients with hay-fever.

Pottenger [34] discussed calcium therapy in relationship to the causation and treatment of allergic conditions, and stated that the disappointment experienced in calcium therapy is due to the fact that one cannot always produce the desired effect even though the use of calcium is based on sound physiologic principals. He stated that physiologic reactions differ from test-tube reactions because the individual difference in patients and difference in the same patient at different times which interferes with obtaining the same result following what seems to be the same therapeutic stimulus. He stated that at times the reaction is the reverse of the one expected.

Dust-Free Air.—Cohen [35] reported a study of the effect of placing patients in a dust-free room. Such a room was prepared through renovating, covering mattresses and pillows with impervious material, and the installation of an electric fan so constituted as to mechanically filter all air which was blown into the room. A fan which he devised for this purpose was described in a previous paper. He studied the effect of heat, cold and other physical factors on patients residing in a dust-free atmosphere. For patients whose symptoms disappeared under these conditions, an effort was made to discover some noxious inhalent factor in the house or working environment of the patient through testing by actual exposure of the patient to substances found in these environments. He then rearranged the environment on the basis of the information gained, or had the patient remain in a dust-free room for a portion of the time. In patients who did not respond to this method of diagnosis or therapy, he made dietary tests and other tests commonly used in the study of this type of illness.

X-Ray.—Roentgen therapy in the treatment of asthma may, in the future, prove interesting and of definite scientific value. This line of work has not yet progressed, however, to a point where it can be used

34. Pottenger, F. M.: The Potential Asthmatic, J. Lab. & Clin. Med. **13**:913, 1928.

35. Cohen, M. B.: Further Observations on the Use of Filtered Air in the Diagnosis and Treatment of Allergic Conditions, J. Lab. & Clin. Med. **13**:963, 1928.

scientifically in therapy. Definite reactions occasionally appear in the allergic patient following the use of the x-ray, and striking improvement sometimes follows.

It is not possible in a given case to predict what effect the x-ray will have, nor is it possible to decide what area of the body should be exposed if it is to be used in therapy. A considerable amount of work has been done along this line. Waldbott [36] reported a study of eighty-one patients treated with small doses of x-ray over the spleen. He stated that eighteen of fifty-six children became symptom-free, sixteen were temporarily relieved, and that twenty-two did not respond to treatment. Three of twenty-five adults became symptom-free, nine were temporarily relieved, and thirteen were unimproved. The patients designated as symptom-free were under observation for a period of from six months to more than three years. Waldbott stated that patients less than 4 years old showed the best results, and that treatment in patients exceeding 30 years of age was less effective. (This can be said of almost any method of therapy employed in the treatment of asthma.) He stated that the best results were obtained among patients with the clinical manifestations of allergic bronchitis, and that better results were obtained in nonsensitive patients than in those who proved to be sensitive to food, pollen and emanations of various kinds.

He stated that in thirty-seven of 169 exposures, a reaction characterized by nausea, vomiting, abdominal pain or asthma followed and that better results were obtained among the patients who reacted in this way. He made the interesting observation, that, as a rule, the number of eosinophils in the blood increased immediately after treatment and returned to normal subsequently. He expressed the opinion that this type of treatment should be applied only in cases in which the patients do not respond to the method of therapy usually employed in this condition.

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36. Waldbott, G. L.: Roentgen-Ray Treatment of Spleen in Asthma and in Related Allergic Diseases, Arch. Int. Med. **41**:683 (Jan.) 1928.

TUMORS OF THE NOSE AND THROAT

A REVIEW OF THE LITERATURE *

GORDON B. NEW, M.D.
Section on Laryngology, Oral and Plastic Surgery, The Mayo Clinic
AND
WALTER KIRCH, M.D.
Fellow in Surgery, The Mayo Foundation
ROCHESTER, MINN.

NASOPHARYNX AND PHARYNX

Schleglmünig [1] reported a case of a fibroma of the nasophrynx in a girl, aged 13, and cited from the literature a few cases of this type of tumor in girls; as a rule, these tumors occur in young boys. He quoted Bensch [2] as having said that these tumors are due to the fact that the periosteum in a limited zone in the base of the skull is unable to produce bone tissue, and the surplus of nutritive substances are used in the development of a hypertrophic condition. He stated that the development of the bony skull in girls is arrested earlier than in boys, and for this reason fibromas usually develop in boys; if they do appear in girls, they become retrogressive early, as in his case. Bensch suggests this merely as an hypothesis. An objection to this hypothesis is that these tumors do not always appear at the point named by him as typical. Coenen [3] has suggested another hypothesis: that basal fibromas are tumors of the bone. The chondrocranium would be the matrix of these tumors. In this way, the various positions, the juvenile character and the spontaneous involution could be explained. The tumor is active in its growth during the period of the greatest growth of the person. The predominance of this type of tumor in the male sex is not, however, explained.

Morard [4] expressed the opinion that nasopharyngeal fibromas can

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* This review consists of the more important papers that have been published from October, 1926, to October, 1927, inclusive. Most of the papers have been reported by simply suggesting their contents; further details may be obtained by consulting the bibliography.

1. Schleglmünig, Josef: Ueber ein "typisches Nasenrachenfibrom" bei einem Mädchen, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17**:1, 1926-1927.

2. Bensch, quoted by Schleglmünig.

3. Coenen, quoted by Schleglmünig.

4. Morard, C.: Recueil des faits, un cas de fibroms naso-pharyngion, Rev méd. de la Suisse, Rom. **46**:934, 1926.

be compared to uterine fibromas. They appear at the age of puberty and disappear spontaneously with activity of the sexual glands. Their appearance would be due, according to the author and to Escat whom he cites, to exaggerated chastity. He presented one case in which there were several recurrences after removal of the tumor by different methods. The subject in consideration led a regulated life and was unmarried.

Sommer [5] reported the presence of a hairy, polypoid tumor of the nasopharynx of a girl, aged 5 years; it was removed with the cautery. The growth was 3.5 by 1.5 cm. and was causing some trouble in swallowing. The sessile base was attached to the base of the skull. The tumor consisted chiefly of fat and connective tissue, and was covered with epidermis including all the layers of the skin, hair follicles, sebaceous glands and sweat glands. A diagnosis of teratoma was made. This type of tumor is rare.

Ferreri [6] called attention to a group of tumors of the nasopharynx first mentioned by Schmincke and named by him lympho-epithelial tumors. He expressed the belief that they are epithelial tumors with rapid formation of lymphocytes. They are usually found near the tonsils, the hard palate, the soft palate and the nasopharynx. The tumors grow rapidly, consist of reticular stroma rich in nuclei and are similar to sarcoma. The stroma presents, here and there, numerous epithelial elements. Numerous lymphocytes are disseminated throughout the tissue. These tumors rarely metastasize or cause cachexia, although in the experience of most observers there is a small primary lesion with early and extensive metastasis. The marked improvement of the patient under treatment by irradiation is a factor in the diagnosis.

Quick and Cutler [7] reported a group of twenty cases of transitional cell epidermoid carcinomas. The tumor grows rapidly, metastasizes early, and responds well to irradiation, but general metastasis may develop. Of the twenty cases which were reported: the tonsil was involved in ten, the base of the tongue in three, the larynx in four, the nasopharynx in two and the mucosa of the cheek in one. The diagnosis was established on the basis of the microscopic picture as well as the reaction to irradiation.

Jovin [8] was of the opinion that another species of epithelioma has been individuated, which is characterized by its appearance only where

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5. Sommer, P. E. C.: Hairy Tumor of Naso-pharynx, Nederl. Tijdschr. v. Verlosk. v. Geneesk. **1**:202, 1927.

6. Ferreri, Giorgio: Zur Dignose und Therapie der lympho-epithelialen Geschwülste des Nasen-Rachenraums, Acta oto-laryngol. **9**:441, 1926.

7. Quick, D., and Cutler, M.: Transitional Cell Epidermoid Carcinoma; Radiosensitive Type of Intra-oral Tumor, Surg. Gynec. Obst. **45**:320, 1927.

8. Jovin, J.: Les lympho-épithéliomes du pharynx, Ann. d. mal. de l'oreille, du larynx **45**:129, 1926.

there is lymphatic tissue (in the nasopharynx, thymus and lymphatic areas of the intestinal tract) and by the great quantity of lymphoid elements mixed with the epithelioma, which the author claims enables the recognition of the malignant tissue under the microscope. The tumors are called lympho-epitheliomas. The author does not believe that the lymphatic part of the tissue has anything to do with the malignancy, but that the epithelial tumor has a tendency to attract the lymphatic tissue. He believes that these tumors can be clinically distinguished by the extreme rapidity with which they metastasize, notwithstanding their comparative benignancy, and also by their extreme radiosensibility which approaches that of lymphosarcoma.

In 1921, this type of tumor was also described by Schmincke, who gave it its name, and by Reverchon and Coutard. Schmincke reported seven cases in which treatment with radium and the roentgen ray was employed.

Marx-Münster [9] reported a case of lympho-epithelial tumor (Schmincke). The tumors were characterized by the presence of clumps of lymphocytes. They are to be found wherever branchiogenous epithelium is present, usually in the tonsils, nasopharynx and thymus. This tumor was the first to be found in this situation (the arytenoid fold and sinus pyriformis, right side). The articles by Ferreri, Quick and Cutler, Jovin and Marx-Münster would seem to describe essentially the same clinical and pathologic entity, although with slight variations; this appears to correspond to what Broders would call squamous-cell epithelioma graded 4.

LARYNX

Munyo [10] reviewed all previous methods of treatment for obstinately recurring papillomatosis of the larynx. He mentioned treatment with arsenic and potassium iodide, surgical methods and Ferreri's method of rubbing with gauze. He also discussed the use of radium, which he considered more dangerous than beneficial. He concluded that roentgen-ray irradiation is the only therapy that will cure this disease. Munyo believed that he was the first to apply this treatment, although it was mentioned first in the literature of the French school. He first performs tracheotomy; then a more or less extensive laryngofissure, according to the extent of the growth, removing the papillomas; or, if there is only one papilloma and it is pedunculated, he removes it through the mouth and follows this procedure by one or two applications of the roentgen ray, the first one a month after the operation. In

9. Marx-Münster: Ueber "lymph-epitheliale" Geschwülste des Kehlkopfes, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:392, 1926.

10. Munyo, J. C.: Treatment of Laryngeal Papillomas in Children, Arch. latino-am. de pediat. **20**:700, 1926.

cases of laryngofissure, he maintains the tube in the wound to calibrate the larynx. Munyo presented three cases of his own, and mentioned four in the same hospital in which operation was performed. In none of these has there been a recurrence of the condition for two years after operation.

Gruschetzkaja [11] reviewed articles on various operative procedures for the removal of laryngeal papillomas. He stressed their uselessness when tumors obstinately recurred, and mentioned New's attempts to prevent such recurrence by treatment with radium. He mentioned four of Plum's cases, in which the patients were also treated with radium, but which ended in stricture. He discussed four of Jelinek's cases in which results were not favorable. Roentgenotherapy has not been used extensively; a number of authors mentioned favorable results in a few cases, never more than five. He mentioned Killian, Knidk, Monnier, Reinking, Peter, Jungling, Canuyt and Terracol, Solomon and Blondeau, Buerger and Richou.

Gruschetzkaja reported seven cases of his own. In four of these, the papilloma disappeared after repeated applications of the roentgen ray and remained without recurrence for as long as they were observed (three years). In one case, results were successful, but the patient was not observed later. In another case, the tumor was definitely reduced but did not completely disappear. In another case operation was performed five times without success, and the results were not affected by roentgenotherapy. After a sixth operation, however, the papillomas did not recur, although the patient was observed for a year. All the patients in the series had been operated on several times without effect; their ages varied from 8 to 60 years. The author believed with Monlonguet, Pierquin and Richard that roentgenotherapy prevents proliferation of the laryngeal mucosa. He recommended a moderate dose as preventing all unpleasant effects and yet being effective. He was of the opinion that roentgen-ray irradiation is the only permanently successful treatment for obstinately recurring papillomas of the larynx and does not believe that surgical removal previous to this form of treatment is necessary.

Erdelyi [12] reported a case in a child, aged 6 years, who had papillomas of both cords. These were removed four times intralaryngeally, but each time they recurred after a shorter interval. After the fourth operation, histologic examination appeared to show a preepitheliomatous stage. The patient was operated on again, twice after tracheotomy with the

11. Gruschetzkaja, M.: Zur Röntgentherapie der Larynxpapillome, Strahlentherapie **25**:420, 1927.

12. Erdelyi, E.: Ein interessant verlaufender geheilter Fall von Larynx-Papillom, Monatschr. f. Ohrenh. **61**:552, 1927.

directoscope of Haslinger. After the sixth operation, the papillomas began to regress, and in two weeks they disappeared completely. The child has been well so far. The six operations were performed during eight months. The author believed that the papillomas were inflammatory and due to a filtrable virus and that they disappeared following autoinfection and immunization resulting from operations frequently performed in a short period.

Engelhardt [13] reviewed the literature briefly. He discussed nomenclature extensively, and concluded that making a distinction between ecchondrosis and chondroma is not of much importance, but that it is important to distinguish between benign cartilagenous tumor and mixed tumor. So far as treatment is concerned, he said that unless a malignant condition is clearly present, conservative treatment is usually indicated. He advised laryngofissure whenever the tumor is sufficiently localized. For mixed tumors, he recommended radical treatment, namely, total resection of the larynx.

Birkett and Hutchison [14] reported a case of a chondroma of the larynx which was removed by thyrotomy. The tumor measured 3.5 by 2.5 cm. and weighed 11.5 Gm. The patient died seventy-two hours after operation from bronchial pneumonia. It would seem that in such cases preliminary tracheotomy without insertion of a tube and postponement of the thyrotomy for a few days until the reaction subsides would be advisable. This precaution should prevent many deaths.

Howarth,[15] in discussing the technic of laryngofissure, said: 1. Tracheotomy is not necessary. 2. It is inadvisable to remove the thyroid cartilage. 3. Surgical diathermy is valuable for control of the oozing and for removal of the vocal cord. He expressed the belief that although surgical diathermy may be used in the larynx, as a rule the lesion can be taken care of just as thoroughly and with less secondary reaction by operation rather than by surgical diathermy. Howarth gives the anesthetic intratracheally.

Most laryngologists perform laryngofissure under local and perivertebral anesthesia and do not perform tracheotomy. The thyroid ala is, as a rule, not removed, because of the belief that laryngofissure should be performed for small lesions, and that the large ones are better taken care of by means of laryngectomy.

St. Clair Thomson performs hemilaryngectomy, removing the cartilage after exposure by means of laryngofissure, with excellent results.

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13. Engelhardt, G.: Zur Anatomie und Behandlung der Knorpelgeschwülste des Kehlkopfs, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:77, 1926.

14. Birkett, H. S., and Hutchison, K.: Chondroma of Larynx, Canad. M. A. J. **17**:703, 1927.

15. Howarth, W.: Some Points in the Technique of Laryngofissure, J. Laryngol. Rhinol. & Otol. **42**:725, 1927.

ANTRUM

Thompson [16] reviewed carefully the literature on malignant tumors of the antrum. He brought out the point that exploration of the antrum is advisable in order to obtain tissue for microscopic examination in the presence of pain and the possibility of a malignant condition. He believed that the use of diathermy and radium, depending on the type of lesion present, would be the treatment of choice for this group of tumors.

ESOPHAGUS

Schwarz [17] presented an unusual case. The patient was an adolescent boy, aged 16. When he was first examined breathing was difficult, and deglutition was not possible. Esophagoscopy had been performed six years previously, and he had coughed up polyps which were diagnosed as adenomas. Metastasis had not occurred. Roentgen-ray examination showed a dilated shadow in the thorax. The trachea was pushed out of place and compressed. Esophagoscopy was not possible on account of a high stricture which appeared to be due to protrusion of the posterior wall. A diagnosis of malignant granuloma was made, although the characteristic elevations in temperature, splenomegaly and cachexia were lacking. After treatment with radium and the roentgen ray, the boy was able to take some liquid nourishment. It was then necessary to perform tracheotomy, but the patient died a few hours later in a state of asphyxiation.

The diagnosis was sarcoma of the esophagus and of the posterior wall with metastasis to both lungs. What the author considered unusual in the case was the age of the patient and the site of the tumor, which was at the upper end of the esophagus and in its posterior wall. He believed that a benign polyp had undergone sarcomatous degeneration.

Continued disappointment in the treatment of patients who have esophageal carcinomas has led to modified uses of radium. Herriman,[18] Coryllos and Kaplan [19] advocated the use of radium seeds and roentgen therapy.

Souttar [20] reported 100 cases of esophageal carcinoma, with eighteen postmortem examinations. He condemned gastrostomy as a palliative measure and advocated intubation.

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16. Thompson, G. H.: Malignant Neoplasms of Antrum, Ann. Otol. Rhin. & Laryng. **36**:715, 1927.

17. Schwarz, M.: Ein Spindelzellensarkom des Oesophagus beim Jugendlichen, Arch. f. Ohren-, Nasen- u. Kehlkopfh. **116**:180, 1927.

18. Herriman, F. R.: Malignancy of Larynx and Esophagus Treated by Radium Emanation, J. Laryngoscope **37**:664, 1927.

19. Coryllos, P. N., and Kaplan, I. I.: A Combined Treatment for Cancer of the Esophagus: A Preliminary Note, Am. J. Roentgenol. **18**:328, 1927.

20. Souttar, H. S.: Treatment of Carcinoma of the Oesophagus: Based on 100 Personal Cases and 18 Postmortem Reports, Brit. J. Surg. **15**:76, 1927.

Friedenwald, Zinn and Feldman [21] reported 128 cases of esophageal carcinoma, and stated that their patients had obtained relatively little relief from dilatation.

Wells [22] advocated gastrostomy for esophageal carcinoma and reported twenty-six cases in which gastrostomy had been performed. Eighteen of the patients died within three months after operation, and five died in the succeeding three months.

Moersch and Broders [23] described an unusual case of melanoepithelioma of the esophagus.

Moore [24] published an article on the pathology of cardiospasm, which is illustrated by several specimens removed at postmortem examination. He stated the belief that sufficiently significant changes have been found in the nerve plexuses of the esophagus to explain the condition.

Kelly,[25] in an inclusive article, described the various nervous conditions of the esophagus.

Seeger [26] reported a case of cardiospasm in a boy, aged 12 years, and reviewed the literature on juvenile cardiospasm.

Vinson [27] reported three cases of multiple lesions in the esophagus.

Schall [28] described the esophagus in Pott's disease and scoliosis and demonstrated angulation of the esophagus in patients with spinal curvature.

Moore and Vinson [29] observed a patient with cardiospasm and marked kinking of the esophagus from kyphosis.

Myerson [30] reviewed the literature on syphilis of the esophagus and reported an additional case.

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21. Friedenwald, Julius; Zinn, W. F., and Feldman, Maurice: Cancer of the Esophagus, Am. J. M. Sc. **174**:609, 1927.

22. Wells, J. R.: Gastrostomy for Cancer of Esophagus, Surg. Clin. N. Amer. **7**:381, 1927.

23. Moersch, H. J., and Broders, A. C.: Melanoepithelioma of Esophagus, J. A. M. A. **88**:1319 (April 23) 1927.

24. Moore, I.: Pathology of Oesophagectasis (Dilatation of Oesophagus without Anatomic Stenosis at Cardiac Orifice): Demonstration of 5 Further Specimens, Proc. Roy. Soc. Med. **20**:31, 1927.

25. Kelly, A. B.: Nervous Affections of the Oesophagus, J. Laryng. & Otol. **42**:221, 1927.

26. Seeger, S. J.: Cardiospasm: Report of Case in Boy of Twelve, Wisconsin M. J. **26**:154, 1927.

27. Vinson, P. P.: Simultaneous Occurrence of Multiple Lesions in Oesophagus: Report of Three Cases, Arch. Otolaryngol. **5**:502 (June) 1927.

28. Schall, L. A.: Esophagus in Pott's Disease and Scoliosis, Ann. Otol. Rhin. & Laryng. **36**:57, 1927.

29. Moore, A. B., and Vinson, P. P.: Cardiospasm, with Kinking of Esophagus from Kyphosis, Radiology **9**:73, 1927.

30. Myerson, M. C.: Syphilis of Esophagus, Med. Clin. N. Amer. **10**:919, 1927.

McLoone [31] observed a case of unusual congenital atresia of the esophagus with both upper and lower segments ending in blind pouches and united by thin cordlike tissue.

Vinson and Dobson [32] observed tuberculous stricture of the upper part of the esophagus in a case of advanced pulmonary tuberculosis. They advocated dilatation for strictures of this type.

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31. McLoone, J. E.: Congenital Atresia of Esophagus, Wisconsin M. J. **26**:258, 1927.

32. Vinson, P. P., and Dobson, H. E.: Tuberculous Stricture of the Oesophagus: Report of a Case, Am. Rev. Tuberc. **16**:53, 1927.

News and Comment

The American Board of Otolaryngology held an examination in New York, on October 11, in which 130 applicants were examined, of whom 113 were passed. Another examination was held in St. Louis, on October 15; 79 were examined, of which number 68 were passed.

The Board will hold an examination in Portland, Ore., on Monday, July 8, 1929, during the session of the American Medical Association, and in Philadelphia in October, 1929, preceding the meeting of the American Academy of Ophthalmology and Otolaryngology in Atlantic City.

Those who desire information relative to the examinations are requested to communicate with Dr. W. P. Wherry, Secretary, Board of Otolaryngology, 1500 Medical Arts Bldg., Omaha.

H. P. Mosher, President.

Abstracts from Current Literature

Ear

GAUCHER'S CELLS IN THE TEMPORAL BONE; CAUSAL GENESIS OF OTOSCLEROSIS. HANS BRUNNER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **22**:60 (June 16) 1928.

The author reports a case of Gaucher's disease. E. Epstein described this disease, in 1924, as a systemic disease of the reticulo-endothelial and histiocytic apparatus of the blood-forming organs. He assumed that certain foreign bodies in the blood, especially cerebroside (Lieb's cerasin), cause an irritation which is followed by a reaction of defense in the spleen, liver and bone marrow. This reaction is produced, not by the blood elements, but exclusively by the histiocytic cell elements. Epstein thought that continued irritation leads to a pathologic change of these cells which is marked not only by an enormous increase in volume, a peculiar structure of the cell plasma and swelling of the nuclei, but also by an increased new growth of young histiocytes and occasional formation of giant cells and megakaryocytes. L. Pick stated that the anatomic and histologic signs of Gaucher's disease can be found in nurslings and in early childhood. Although the process starts simultaneously in the spleen, liver, lymph nodules and bone marrow, the process in the spleen predominates. Forms are found, however, in which the disease of the bone predominates. Pick stated that Gaucher's disease is not a reticulo-endothelial, a reticulocellic or a histiocytomic disease. The immediate causes of its manifestation are unknown. In more than a third of the cases, the disease was familial. Most of the patients were women. Epstein assumed a disposition of the histiocytic cell system in the blood-forming organs, whereas Pick presented Gaucher's disease as a primary congenital and familial deviation of metabolism on a constitutional basis which is not hereditary. Brunner claims that the disease is similar to otosclerosis, and reports a case in point with a detailed description of the histologic observations.

The patient, a woman, aged 51, had been seen on March 20, 1923, in Alexander's outpatient department. She suffered from frequent headaches, and since 1916, from tinnitus. The left drum membrane was red and bulging; the right Shrapnell membrane was red. Both drum membranes were incised, but pus was not obtained. On account of headache and fever (102 F.), the patient was admitted to the hospital. Venereal disease was absent. The bilateral otitis disappeared gradually, but an irregular temperature, up to 104 F., and symptoms in the lungs set in. The Widal reaction, was weakly positive. The patient was transferred to the department of internal disease, where she died on April 15.

Necropsy, performed by Dr. Schnitzler, disclosed acute leptomeningitis on the base and convexity of the brain, croupous pneumonia of the right upper and middle lobe of the lung, swelling of the spleen and liver and parenchymatous degeneration of the myocardium and kidneys. Detailed microscopic observations of the temporal bone, the marrow spaces, the spleen and the liver are given. The author assumes that, clinically, a bilateral otitis media simplex was present, which healed after paracentesis. Pneumonia followed, complicated by a fatal metastatic meningitis. Microscopic observation showed bilateral otosclerosis and Gaucher's cells in the marrow spaces of the temporal bone.

This case shows, for the first time, that in Gaucher's disease of the adult, Gaucher's cells can be found in the rudimentary marrow spaces of the temporal bone, and that not only the osseous structure of the temporal bone can participate in the diseases of the skeleton, but that also the marrow spaces of the temporal bone can be affected alone in diseases of the bone marrow and of the reticulo-endothelial system. The combination of otosclerosis and Gaucher's diseases leads to a discussion of the causal genesis of otosclerosis. The formal genesis is clearly known, especially through the work of O. Mayer, but the causal genesis is in doubt. Manasse's view that otosclerosis is an inflammatory process, and Witt-

mack's idea that it is the consequence of a passive hyperemia, are not accepted by the majority of otologists. According to Mayer, otosclerotic foci must be considered to be growths which develop from the embryonic malformation of tissue. They can be looked on as hyperplasias of abnormally placed or stimulated tissue and thus are hamartomas or malformations. These malformations concern the osteoplastic tissue which is found, as a rule, at certain spots in the capsule of the labyrinth, so that a transformation of tissue takes place. Hamartias are a fault in tissue construction. They are found in the liver, kidney, spleen and many other places. If such malformations of tissue (hamartias) appear in a hyperplastic form and look like tumors, they are called hamartomas. If autonomous, real tumor-like excesses of growth develop from these malformations of tissue, they are called hamartoblastomas. They may be malignant. It is difficult to classify otosclerosis in any of these groups. E. Albrecht and Hommerich define hamartomas as tumor-like malformations, located in the various organs, which are not grossly differentiated from tumors, but which differ from them by the absence of new formation of cells, the absence of expansion and destruction and the more or less marked continuation of the function of the organs. Therefore, Brunner adheres to his own view (1924) that otosclerosis is a dystrophic process affecting the bone and the chondroid tissue of the capsule of the inner ear, under the influence of a still unknown disturbance of metabolism, and based on a constitutional hereditary inferiority. The process forms foci which can extend as the disturbance of metabolism continues. The localization is dependent on the distribution of the main vessels. Brunner claims that the reasons which Mayer cited in support of his claims apply also to his own claim. Brunner states that a comparison between Gaucher's disease and otosclerosis speaks for his point of view.

1. Both diseases are familial. 2. Both diseases preponderate in women. 3. Gaucher's disease is not inherited. Otosclerosis itself is not hereditary; only the predisposing inferiority of the temporal bone and the general inferiority of the organism are hereditary. 4. Both diseases may manifest themselves at an early age. 5. Both diseases show a pronounced chronicity.

In both diseases, a constitutional factor is present, although the cause is unknown. In otosclerosis a status degenerativus (Bauer) is present. It is not known whether in otosclerosis disturbance of metabolism is the primary change or whether the osteoblasts, originating in the endothelium of the vessels, become diseased primarily, so that they produce only a precollagenous or reticulated substance instead of lamellar bone. To this group of diseases belong also Paget's disease and, probably, osteogenesis imperfecta. Gaucher's cells incline toward necrosis and fibrosis, not to aggressive proliferation. Osteitis deformans leads to a diffuse transformation of the capsule of the inner ear, whereas otosclerosis, as a rule, forms circumscribed foci in the surroundings of the main vessels, but shows less tendency toward proliferation. The petrous bone is different from all other bones, because chondroid tissue persists into advanced age, on account of the early cessation of development and because all factors of the infantile bone persist into advanced age. Therefore, also, the pathologic changes of the bone must probably be different. It must not be forgotten that the exact investigation of other organs (skeleton and endocrine glands) has not been carried out so far, although it may be expected that such investigations would greatly increase the knowledge of the pathogenesis and therapy of otosclerosis.

COMPLETE ANOTIA COMBINED WITH APLASIA OF THE TONSIL. A. SERCER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **22**:75 (June 16) 1928.

Microtia is seen frequently, but anotia occurs rarely, only five cases having been reported (Lynch, Krampitz, Colomiatti, Chiari, Iwata). Two were bilateral, two left-sided and one right-sided. The case observed by Krampitz was that of a boy, aged 8 years, with a defect of the thumb and dextrocardia. Colomiatti's patient, aged 35, heard various tones by bone conduction. Other cases which might, however, be classified as microtia were mentioned by Polidoro Virgilius (1531), Lycostemus (1557) and Lachmann (1675). Sercer described a case in point. An

infant girl, aged 5 months, came from a family without defects. The parents were not blood relatives. The right auricle was missing entirely. The skin on the right side of the head was perfectly smooth. The right half of the soft palate was not well developed. The right tonsil and the right anterior palatine arch were absent. Instead of the palatine arch, a fold extended directly to the alveolar process of the upper jaw. The posterior palatine fold was reduced to a flat fold of the mucous membrane which led from the epipharynx downward. Schmidt saw a patient with absence of the tonsil and defect of the testicle on the same side. A malformation of the outer ear is independent of a malformation of the middle or inner ear. The arrest of development in the author's patient concerned the outer portions of the groove of the first branchial cleft and the inner portions of the second branchial cleft. It can be assumed that the organs which develop from the interjacent tissue were arrested in their development, namely, the dorsal portion of the first and second branchial cleft and the medial portion of the first branchial cleft. These are the ossicles and the tubotympanal tube. The author thinks that aplasia not only of the outer ears and the tonsil, but also of the middle ear with the tube was present.

THE PHASIC CHARACTER OF THE STATIC AND KINETIC ILLUSIONS PRODUCED BY THE VESTIBULAR APPARATUS. F. LEIRI, Ztschr. f. Hals-, Nasen- u. Ohrenh. **22**:79 (June 16) 1928.

The article must be read in the original. A few points may be mentioned at random. The author previously reported some illusions concerning the direction of gravity which appeared on inadequate irritation of the vestibular apparatus and in consequence of unimpeded neck position reflexes and vestibular position reflexes in experiments made according to the technic of Delage. The inadequate irritation was galvanic. Now the author treats analogous phenomena of illusions based on experiments by Fischer and Wodak with caloric and rotatory irritation, and those of Grahe with caloric irritation. Leiri studied the phasic character of the static and kinetic illusions after irritation of the vestibular apparatus. The reflexes incited by the vestibular apparatus cannot be considered contractions of muscles, but only a pull which the contractions exercise on the various parts of the body. These unconscious contractions of the muscles are the "foreign power" which endeavors to turn the body in the direction of the rotation after violent turning.

Purkinje was acquainted with this phenomenon. The "tactile vertigo," which also has been described by Purkinje, and the past pointing in Bárány's test, after rotatory and caloric irritation of the vestibular apparatus, as well as the post-rotatory falling motion and the falling motion in caloric and galvanic irritation, are dependent on the phenomenon. Fischer and Wodak found that in irritation of the right ear with cold water, the inclining to the right and the illusion of an inclining to the left appeared for a relatively short period. Afterward, another phase appeared. The body inclined to the left, and it seemed as if the body inclined to the right. The phenomenon was weaker, however. Such a change of phases with inclining and illusion of inclining in different directions was repeated several times during a relatively longer period (thirty minutes), although the phenomena became continuously weaker. This phasic rhythm of the motor phenomena and illusions in caloric irritation of the vestibular apparatus (it is found also in galvanic and rotatory irritation of the same organ) appear only under special conditions (Fischer and Wodak). The persons must be trained especially. They must give way to the motions and tendencies of motions, and they must endeavor to eliminate the critical inhibition of the subcortical reflexes. This special consideration (of Fischer and Wodak, and of Grahe) of the causes of the phasic contractions of muscles on both sides of the body becomes clear. As contractions of muscles occur on the right side which pull the body to the right, after cold douching of the right ear, these contractions must elicit antagonistic contractions on the left side which stop the movement of the body to the right.

It is mechanically impossible to produce a certain inclining of the body only by the antagonistic effect, because the body would fall over. The antagonistic acivity of the muscles must also come into play. These activities are probably innervated by the cerebellum. Fischer and Wodak assume a double function in the vestibular apparatus, a reflex action which incites the motor reaction and a sensory action which transmits the phasic illusions concerning the position of the body. Yet Grahe's investigations disprove this. Grahe observed the same rhythmic inclination in various directions on caloric irritation of the hearing organ in a patient in whom the labyrinth had been removed in its entirety. It is true that prolonged douching en masse was necessary to obtain the result. The first inclining was always directed to the irrigated side, regardless of the temperature of the water.

The author mentions a circumstance which may make it appear possible that the primary reaction also, the innervation of the muscles which draw the body to the douched side, emanates from the cerebellum. The douching en masse of the ear without a labyrinth (Grahe), which caused a contraction of the vessels, influenced certain parts of the nervous system, and the decrease in function was the cause of the contractions which drew the body to the right. Weed, Olmsted and Warner showed that a lesion of the cerebellum causes a rigidity of the muscles on the same side of the body.

The author mentions a phasic sensation found by Fischer and Wodak after inadequate irritation of the vestibular apparatus. On returning to land after a long trip on a turbulent sea, most people notice that the body is in a rocking motion, similar to that to which they were exposed on the boat. This means that the force which appears as gravity, and which one feels by virtue of the sensibility of position and motion, continuously changes its strength and direction in relation to the body. It is not a vestibular sensibility, because that does not exist. The unconscious reflex muscle contractions give one the sensation of an up and down rocking motion exactly like that felt on the sea when its effect on the body is added to gravity. The muscle contractions which emanate from the vertical semicircular canals contribute to the conservation of equilibrium if the body is disturbed in its equilibrium by pushing. The motion of the endolymph activates the contractions of the muscles toward the side of the shifting of the endolymph. When terra firma is reached again, the muscle contractions caused by shifting of the endolymph stop, but the rhythmic cerebellar innervation of muscle action, which is antagonistic to the vestibular reflexes, persists for a while. On account of the long sea voyage, the elimination of cortical inhibition of subcortical reflexes in reference to the innervation of the equilibrium becomes habitual and persists for a while.

AMBERG, Detroit.

Miscellaneous

TRAUMA DURING BIRTH AS CAUSE OF DIFFUSE DILATATION OF THE ESOPHAGUS. P. H. G. VAN GILSE, Ztschr. f. Hals-, Nasen- u. Ohrenh. **22**:91 (June 16) 1928.

Dilatations of the esophagus are circumscribed, "diverticula" or more or less diffuse. The cause of the latter type is: (1) organic, caused by a stenosis in the presence of a tumor which leads to a secondary dilatation of the distal end through a formation of a stenosis or diaphragm; or (2) functional, caused by spasm of the muscles at the lower end of the organ at the cardia or the hiatus diaphragmaticus. Paralysis of the muscle system is also mentioned, especially following diphtheria and in botulism. A lesion of the vagus nerve must be assumed. The animal experiment furnishes similar symptoms. Neuritis of a different etiology (for instance syphilis) and bulbar lesions may also cause paralysis of the muscles. In these instances, pronounced dilatations occur. Idiopathic dilatations may occur without any apparent reason. They appear most often at puberty, but they may occur between the ages of 8 and 10 years.

A female patient of the author had, during her later school years, eaten voluminous meals in great haste. Jackson mentioned as a cause of dilatation also abnormality of the left lobe of the liver, according to Mosher's view, but he localized the spasm at the level of the diaphragm, the "diaphragmatic pinch-cock." Guisez accused poor mastication.

The author mentions, for the first time, a case in which paralysis of the esophagus was caused by a trauma at birth. The patient, a girl, born on May 19, 1926, was brought to Prof. Cornelia de Lange on April 28, 1927. Solid food was vomited. Delivery by breech presentation had been difficult. The child did not cry, but whined continuously. On the third day, mucus and blood were still flowing from the nose. The infant took the breast only on the fourth day, but the milk came out of the right nostril. On the fifth day, 50 Gm. of milk was retained. The child opened her eyes only after eight days. In the second week, it was noticed that the left hand and foot were edematous. A month later, the child became still more apathetic and developed pronounced dyspnea while drinking. On June 22, she was extremely sick, had continuous high fever and had to be given epinephrine and camphor. Both arms and legs were flabby. The child was fed with a tube and had improved considerably by June 30. On June 27, solid food was still returned. There was a slight ptosis of the right eye, the pupil was somewhat narrowed and the eyeball was retracted (Horner's symptom). A slight paresis of the left hand and a still slighter one of the left arm prevailed. All muscles of the left hand and the nerves of the left arm and plexus (Erb's point) reacted normally to the faradic current. All muscles of the face on both sides responded promptly to galvanic irritation. There was no reaction of degeneration. Roentgen examination revealed dilatation of the esophagus with paralysis. Low down spastic symptoms were noted. Esophagoscopic examination in the dorsal position bore out the results of the roentgen examination. After the opening of the esophagus was passed easily, a wide tube was encountered. After a few contractions, a rather firm closure at the hiatus of the diaphragm and at the cardia was noticed. The vocal cords moved normally.

The paralysis was caused by a trauma at birth, probably by one resulting in a hemorrhage in the medulla oblongata at the level of the nucleus of the vagus, most likely in the region of the fibers which innervate the esophagus. In the beginning, parts of the central portion which innervate the throat (milk from the nose) and perhaps nuclei innervating the vocal cords (absence of plain sounds) were injured; also contiguous parts of the pyramidal tracts were affected. The paralysis of the pharynx was unilateral. This fact was important in this patient, because the first phase of swallowing, the buccopharyngeal, was possible. The paralysis of the esophagus was caused by a bilateral disturbance in the region of the vagus. Unilateral conditions cause only slight disturbances of the esophageal act of swallowing, or none, as Neumayer states. The complex innervation of the lowest portion of the esophagus was recently demonstrated by Jacques and Rousseaux. The vagus is the dilating and the sympathicus the constricting nerve.

The author gives an exact localization of the trauma. During the course of the disease, at the end of June, a relapse of the hemorrhage occurred, perhaps under the influence of an infection. Then the paralytic symptoms were evident. Treatment consisted in regulation of the diet. Frequent meals consisting of finely ground food were given; the quantity and quality were carefully controlled in regard to calories and vitamins. After about one year of this regimen, the child could eat more solid food, for instance, hard biscuit. If the esophagus was not loaded too much, the fluoroscope showed almost normal conditions. The left arm and hand functioned better. During a severe cold, however, the old disturbance of the esophagus occurred again.

A careful treatment by probes and, finally, Heller's operation might be considered in case the conservative treatment does not lead to any improvement. Besides traumas at birth, the effects of other diseases of childhood must be considered, either through lesions of the nuclei, for instance, in encephalitis, or through effects of toxins, for instance, in diphtheria, which may cause an injury of the innervation of the esophagus. Ylippoe in his discussion of pathologic anatomic disturbances in premature births mentioned that hemorrhages in the medulla oblongata can more easily be diagnosed than other hemorrhages in the brain. Besides attacks of asphyxia, two symptoms are rather constant: (1) the impossibility to swallow, and (2) the "jumping-jack" symptom (on percussion of the sternum).

AMBERG, Detroit.

Society Transactions

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY

Annual Meeting, May 2-5, 1928

LYMAN RICHARDS, M.D., *Abstractor*

JOHN D. BARNHILL, M.D., *President*

PRESIDENT'S ADDRESS. Presented by DR. JOHN D. BARNHILL, Indianapolis.

Recent visits to most of the sectional meetings have shown a stimulating activity and evidence of progressive work in otolaryngology throughout the country. It is apparent, however, that too small a proportion of the attendance at the meetings is made up of men who are actually members of the society. Many nonmembers evidence ability and scientific attainments that should make them welcome and desirable additions. The only alternative is a unification of the section meetings.

The gratuitous work among deafened school children continues to occupy the time of many of our members. Preventive medicine is stressed more and more each year, but its successful accomplishment means less individual and more organized activity, since the elements in any investigation are beyond the reach of any one person. This society has certain funds available for investigative work, and unless these are wasted on some relatively unimportant work, it is suggested that they be combined with that of the American Otological Society, which is now engaged in the study of the problem of otosclerosis.

Interest in affiliated sciences has led us more and more to invite eminent men in many fields to address us, and it would seem fitting to acknowledge our debt to them by electing the most outstanding of them to honorary fellowship in this society.

More and more the practice of otolaryngology demands familiarity with the adjacent structures of the head and neck and with the diseases of the head which may exhibit otolaryngologic symptomatology. Many of our fellows are already widening the field of their activities as witness the many papers on abscess of the brain, goiter and plastic surgery. Should this tendency to expansion become universal, it would seem the natural outcome that at some not far distant day the name of this society be changed to that of the American Society of Head Surgeons.

OTOLOGIC OBSERVATIONS IN TRAUMA OF THE HEAD. Presented by DR. W. E. GROVE, Milwaukee.

This article was published in full in the September issue of the ARCHIVES, page 249.

ANGINA LUDOVICI: AN ANATOMIC AND CLINICAL STUDY. Presented by DR. CHARLES D. BLASSINGAME, Memphis, Tenn.

Ludwig's angina is a phlegmonous process arising from infections within the floor of the mouth and localized in a definite anatomic space. This space has for its floor the mylohyoid muscle, its lateral walls, the bodies of the mandible, its posterior walls and the muscles which form the base of the tongue, and for its roof, the tongue and mucosa covering the floor of the mouth.

Patients with this condition quickly develop alarming symptoms and if not promptly treated, the mortality ranges around 50 per cent. The original foci for this disease are situated around the teeth or within the floor of the mouth. The process may be unilateral, bilateral or confined to the midline. If confined to either side, swelling forces the tongue up and toward the other side; if in the middle, the tongue is pushed toward the roof of the mouth. Simultaneously, there

is edema of the mucosa of the floor of the mouth. Externally, there is a board-like swelling over the region involved. There is no external fluctuation as all the pus is held within the muscular floor. The supposition that the region of the submaxillary gland is the first area involved is not borne out by anatomic studies. In respect to its relation to the muscles of the floor of the mouth, the collection of pus may appear in several places. The two geniohyoid muscles, situated in the midline between the tongue above and the broad flat mylohyoid muscles below, form the landmark for this relationship. Thus the pus may be lateral to the geniohyoid muscles, it may be above them, or it may be below them. A Ludwig's angina may remain localized as such or it may extend posteriorly to the adjacent lymph nodes, and subsequently the infection may enter the general circulation.

Bacteriologically, *Streptococcus* and *Staphylococcus* predominate. *Bacillus septicus* has been found in some cases.

Pathologically, there is a marked and rapidly extending edema of the tissues and an effusion which is serous, purulent, fibrinous or hemorrhagic. Emphysema may be present. This type of angina differs from a sublingual phlegmon in that the latter in time always develops localized pus formation. The question of the presence of free pus in Ludwig's angina depends to some extent on the time of operation. If too early, pus will not be found, or a small collection may be missed. In rare instances, the process may be aborted by conservative treatment and may subside without any evidences of pus formation. In most instances, however, pus will appear sooner or later, since the infective organisms are all pus-forming bacteria.

Symptomatically, the patient is uncomfortable, swallowing is painful and the speech is affected. Saliva cannot be swallowed and dyspnea may appear. External edema may spread so as to involve the entire neck. There may be edema of the epiglottis and glottis.

A successful outcome of such cases depends on preventing the infection from breaking through its posterior barriers, whence it may reach the carotid sheath via the lymphatics, or may descend the neck into the mediastinum.

Treatment consists in thorough surgical drainage of the involved area before there is a break through the anatomic barriers. External incision is preferable, located over the point of maximum swelling and tenderness. It should extend through the floor of the mouth and be long enough for the admission of rubber drainage tubes. If pus is not encountered at once, forceps may be introduced closed through the floor of the mouth and then opened in various directions. When once an abscess has been opened or adequate drainage space provided, drainage tubes should be inserted through which irrigations may be carried out twice a day. The depth of the incision depends on the depth of the pus and its relation to the genihyoid muscle as described.

General supportive treatment should of course be an adjunct in the treatment of any patient suffering from localized or general sepsis. Care must be taken that the wound is not packed too tightly, so as to interfere with good drainage, which must be maintained at all times. Through and through drainage into the mouth is not usually necessary and carries the added risk of aspiration of septic material into the lung.

ANGINA AGRANULOCYTOSIS. Presented by DR. JOHN B. POTTS, Omaha.

This article will be published in full in a later issue.

PRIMARY CARCINOMA OF THE BRONCHI. Presented by DR. L. A. SCHALL, Boston.

Primary carcinoma of the lungs is by no means as rare as is commonly supposed, and statistics covering a large number of autopsies indicate an increased frequency of this disease. Histogenetically, this tumor may arise from the bronchial mucous membrane, the bronchial mucous glands, or more rarely from the alveolar epithelium. Histologically, the former are tumors either of the squamous or of the cylindrical cells, while those from the mucous glands are adenomatous in structure. Men are more frequently affected, and the age group is past 40.

The symptoms of cough, dyspnea, pain, hemoptysis, fever and cachexia all vary in degree and combination, depending on the size and location of the tumor.

Cough is the most constant complaint. Dyspnea often occurs early and is increased by exertion. Pain is described as deep in the chest. Slight or severe hemoptysis may occur at any time during the course of the disease. Secondary infection with the development of bronchiectatic or abscess cavities may follow.

The condition must be differentiated from tuberculosis, pulmonary abscess or gangrene, cyst, foreign body and aneurysm. Cancer may also be present along with any one of the conditions mentioned, particularly with tuberculosis. X-ray examination affords a valuable aid in this differentiation. Changes in the roentgenogram, unless due to bronchial obstruction, must necessarily indicate a late form of carcinoma.

The diagnosis rests largely on the bronchoscope. The picture is that of bronchial occlusion, either by an outcropping tumor mass, or by a stenosis due to infiltration of the bronchial wall with unbroken bronchial mucosa. Biopsy affords a certain diagnosis. In any obscure condition of the chest bronchoscopy should be an important link in the diagnostic chain.

THE EFFECT OF OTITIS MEDIA IN PATIENTS PREVIOUSLY OPERATED ON FOR MASTOIDITIS. Presented by DR. HAROLD L. LILLIE, Mayo Clinic, Rochester, Minn.

A second attack of otitis media may occur long after the initial attack, during which a mastoid operation may have been performed. There is little foundation for the idea that once a patient has had a mastoid drainage there will be no further infection of the middle ear.

Certain persons are more prone to develop infection of the middle ear than others, due either to some peculiar anatomic configuration of the eustachian tube or nasopharynx, or to the habit of improperly blowing the nose, in which act undue pressure is induced which forces infection from the nose into the ear.

If the original mastoid operation has been complete, there is little likelihood of reinfection. The feeling that the operation is a simple one is the cause for many recurrences. The term simple mastoid should be replaced by complete mastoid operation.

In fifty-three cases of recurrence or reinfection of the ear and mastoid, all but three of the patients required a second operation, and in all of these it was found that the mastoid cells had not been completely removed. The tympanic antrum had reformed as a space in the scar tissue where the cells had been removed from around the antrum. In two cases in which complete operation had been performed, the mastoid scar suppurated and required superficial drainage as in any other infection of a surface wound. In three cases, acute otitis media yielded to simple myringotomy without any symptoms or signs of mastoid infection.

THE PREVENTION OF NASAL DEFORMITIES FOLLOWING THE SUBMUCOUS OPERATION. Presented by DR. W. W. CARTER, New York.

This article appears in full in this issue, page 555.

ATELECTASIS OF THE LUNG: REPORT OF TWO CASES. Presented by DR. ELBYRNE G. GILL, Roanoke, Va.

In 1890, William Pasteur first described massive collapse of the lung in a fatal case of diphtheria. In 1908, he reported the same condition occurring as a postoperative complication. Since then other authors have added to the list, and the condition is now a well recognized and not infrequent clinical entity. There is still considerable difference of opinion concerning the etiology of massive atelectasis. It may follow a variety of lesions such as bronchial and pulmonary infections; nonpenetrating wounds of the thorax, abdomen and lower extremities; increased intra-abdominal pressure; in nasal and pharyngeal diphtheria; with foreign bodies in the trachea and bronchi, and following operations on the abdominal wall. Lee, in a study of thirty cases, found two factors constant in almost every case, first a thick, viscid bronchial secretion, and second, some inhibition of coughing.

The most frequent symptoms are pain in the chest, sudden rise in temperature, pulse and respiration rate, cough and dyspnea. There is unilateral dulness, with displacement of the heart and mediastinum to the affected side. A differential diagnosis must be made between dilatation of the heart, pulmonary embolus, pulmonary infarct, pleuritis with or without effusion, pneumothorax and diaphragmatic hernia.

The treatment depends on the etiologic factor. If a foreign body or thick obstructive secretion is present, bronchoscopy is indicated. The prognosis is good, unless pneumonia supervenes. Two illustrative cases of patients, who were treated by myself, follow.

CASE 1.—An infant, aged 13 months, had aspirated a pento bean, followed by several coughing spells. Physical examination showed dulness and an absence of breath sounds over the right side of the chest and compensatory emphysema over the left side. X-ray examination showed the heart and mediastinum displaced to the right, completing the typical picture of right obstructive atelectasis. Immediate bronchoscopy was performed and a portion of the bean removed. Secretions were so profuse and the child in such critical condition that an immediate tracheotomy was done with the bronchoscope still in place. Secretions were aspirated through the tube every fifteen minutes night and day for four days. Four days later an x-ray picture showed more air entering the right lung. At a second bronchoscopy on the seventh day, the remainder of the bean was removed. Gradual improvement followed, and the child was discharged on the twenty-first day.

I feel that a life was saved in this case, first by not prolonging the bronchoscopy more than ten minutes, and second by the tracheotomy, which would have been performed even if all the bean had been removed the first time, in order to aid in the expulsion and removal of the secretions in the bronchi. Suction was maintained by the introduction of a rubber catheter and the loosening of the secretions by dropping physiologic solution of sodium chloride into the tube every three hours.

CASE 2.—A child, aged 5, suspected of having a foreign body in the bronchus, was given an x-ray examination and found to have a partial collapse of the lung. Physical signs corroborated the diagnosis of massive atelectasis of the left lung. At bronchoscopy a polypoid mass was found to be completely obstructing the left main bronchus. This was removed as a cast of the bronchus, following which the lung rapidly became aerated. Examination of the specimen removed showed it to be composed of inspissated fibrin and mucus with various bacteria, leukocytes and epithelium. *Staphylococci* predominated.

Experimental atelectasis has been produced in dogs by the injection of secretions which have caused atelectasis in human beings and also by injection of a solution of acacia pearls. Working on two dogs, I failed, in spite of careful acacia injections, in well narcotized and cocainized dogs, to produce any evident atelectasis. In neither dog was there an abdominal incision made as in the dogs used by Lee, Tucker and Clerf. The sixteen cases, reported by Pasteur in 1914, all followed abdominal operations.

A FURTHER REPORT ON THE MODIFIED RADICAL OPERATION FOR THE CURE OF CHRONIC OTORRHEA. Presented by DR. HUGH B. BLACKWELL, New York.

The treatment of chronic otitis media is often determined by individual experience and hence varies to a wide degree, good results being secured by almost opposite methods and procedures. I have long felt that the wide application of the radical mastoid operation has not been justified by its results, and since 1912, I have been performing a modified radical mastoid operation which has for its prime objective the preservation of the hearing in a way not possible in the classic radical operation. The relative rarity of a patient on whom a double radical mastoid operation has been done is due, I believe, not to the fact that such an

operation was not indicated but because the potential complete loss in hearing deterred the surgeon. A double modified operation on the other hand is feasible, and I have many patients now working gainfully at their occupation on whom this has been done. As more propaganda is spread concerning deafness, more patients are preferring palliative treatment for chronic otorrhea rather than taking the risk of a radical operation and loss of hearing. Such patients could often be entirely relieved of their otorrhea and still retain useful hearing by means of the modified operation. The object is not, as in the radical operation, primarily to obtain a dry ear, but to restore hearing. Since the mucosa of the middle ear is undisturbed, it follows that at times a mucoid discharge may occur, which is usually intermittent, nonodorous and of little discomfort to the patient.

Statistics show that the death rate from diseases of the ear is increasing, and more and more insurance companies are refusing patients thus afflicted as poor risks. The radical operation is falling gradually into less favor with many otologists, except in the face of suspected intracranial complications. Conservative treatment is adopted so long as the patient can be closely followed and no signs of complications appear. The latter, however, may appear unexpectedly, and radical treatment may then be too late to forestall a meningitis or abscess of the brain.

Frequently a condition of chronic mastoiditis is designated as chronic otitis media, when the true site of the disease is not in the middle ear. When the mastoid infection is eradicated, the middle ear is no longer made the avenue of escape of the infectious discharge. Since most of the vital spots from which infection extends to the intracranial structures are adjacent to the mastoid antrum, it follows that the best preventive is drainage of the mastoid antrum by proper surgical methods.

The mastoid operation is usually indicated in cases in which the discharge has persisted for from several months to several years. Beyond eight to ten years, hearing has been so far lost that the modified operation cannot restore it. It is the operation of choice when discharge persists in the presence of good hearing, when, even though the hearing is poor, the drum is more or less intact, when a recurrent mastoid infection has produced a narrowing of the canal, and finally in cases of discharge with exostoses of the canal. All these indications apply particularly to children and young adults.

The essential feature of the operation is the removal of a wedge-shaped portion of the superior bony wall of the canal to such an extent as to afford direct drainage to the external attic of the middle ear, thus preventing discharge from reaching the tympanic cavity proper. The operation is performed through the usual postaural incision, which, however, is carried further forward above the top of the auricle. The antrum is widely opened, the posterior bony wall of the canal lowered, and a curet inserted into the external attic and, with the horizontal canal as a guide, the external wall of the attic is removed, care being taken to avoid any injury to the incudomalleal joint. The posterior wall of the canal is further lowered down to the facial ridge. Granulations and polypi lying in the internal and external attic are removed without disturbing the drum or ossicles. A radical meatal flap is then cut and sutured in place and the antral cavity lightly packed with iodoform gauze, the posterior wound being closed throughout.

Postoperatively, the dressings should be done daily, and every effort made to prevent infection in the soft parts and to keep the antral cavity free from granulations until epidermatization takes place.

THE DIAGNOSIS OF LARYNGEAL GROWTHS. Presented by DR. CHARLES J. IMPERATORI, New York.

To arrive at the correct diagnosis of any laryngeal growth involves, except in rare instances, a painstaking and extensive examination not only of the larynx but of adjacent and related structures. Many laryngeal growths resemble each other

so closely that any hasty conclusion concerning their identity is likely to prove false. Moreover, it is of the utmost importance to make a correct diagnosis between such conditions as chronic inflammation and cancer.

Clinically, one must determine whether a lesion is of the infiltrating or non-infiltrating character. A lesion in the anterior part of the larynx may be syphilitic or tubercular in the posterior. A generalized inflammation without invasion of the surrounding tissue and with little, if any, loss of mobility is usually a chronic inflammatory lesion or is due to an irritation, either occupational or infectious.

Malignant growths usually invade surrounding tissue and cause a loss of laryngeal mobility, whereas benign growths such as polyps, varices and papillomas rarely do this.

A general history of the patient previous to the laryngeal symptoms is important, as well as the history of the immediate complaint. A systematic examination of the nose and throat should be made, including the sinuses, mouth, tongue, teeth, laryngopharynx, epiglottis and larynx. In the latter, attention should be given the aryepiglottic folds, arytenoids, ventricular bands, vocal cords and subglottic space. The appearance of the mucosa, loss of function and mobility of the cords should be noted. Attachment of any visible growth, whether sessile or pedunculated, should be included.

A general medical examination by an internist is important, and such laboratory data as a Wassermann reaction of the blood, urinalysis, chemical analysis of the blood, examination of the sputum and x-ray examination of the chest and sinuses must be available. All data must then be assembled and studied, and the laryngeal picture again considered in the light of all the evidence at hand. In cases of suspected malignancy, a biopsy should proceed any surgical intervention, and a negative report should always suggest at least a second biopsy before a report is accepted.

In the face of all possible observations, the clinical examination of the larynx must remain the most important guide as to diagnosis and the indications for proper treatment.

TUBERCULOSIS OF THE MIDDLE EAR. Presented by DR. GERRARD H. COX, Glen Cove, N. Y.

Tuberculosis of the middle ear exists more frequently than is commonly supposed, and forms, at least in children, about 15 per cent of all cases of chronic infection of the middle ear. The disease may be primary in the middle ear or mastoid, but usually is secondary to some other tuberculous focus such as the lungs, lymph nodes or intestine. The bacilli reach the ear by way of the eustachian tube, with or without involvement of the latter.

Milk infected with bovine tuberculosis is more common than is realized, and this source of infection is a prominent factor in the infection of the middle ear in children, who are extremely subject to the bovine type of infection.

Clinically, there are two types of infection, one in which the characteristic signs of tubercle are absent and the chronic infection is found to be tubercular only by cultural tests. In the other, tuberculosis is more evident; there is a painless onset, afebrile, a watery discharge, a large, extending perforation or multiple perforations, adjacent adenitis, facial paralysis and sometimes hemorrhage. There may be signs of tuberculosis elsewhere in the body. Deafness depends on the degree of involvement of the cochlea. Mastoid infections result in sequestration and slow healing. The diagnosis is proved either by slow inoculation of an animal or by my method of making a sodium hydrate suspension, centrifugalizing and culturing on Miller's glandular culture medium.

It is important to distinguish between the bovine and human type of infection. In either, the prognosis may be good even after conservative treatment, though complications such as facial paralysis, labyrinthitis and meningitis may occur. Treatment consists first in antitubercular hygiene, rest and improved nutrition. Clean milk is of the utmost importance in children. Mastoiditis requires an

operation for removal of the diseased bone; adenoids should be removed and tuberculin injections may be tried. Ultraviolet light and direct sunlight reflected by means of an auroscope may be tried.

EXTERNAL OPERATION ON THE MAXILLARY SINUS FOLLOWED BY DEATH. Presented by DR. ROSS HALL SKILLERN, Philadelphia.

A man, aged 58, showed evidences of a severe purulent infection of the right maxillary sinus with toxic absorption. A previous conservative intranasal operation a year previously had failed to afford relief, and though the appearance of the patient marked him as a poor operative risk, it was decided that the best chance lay in a radical Caldwell-Luc operation. This was performed without difficulty, the sinus was filled with pus and the lining membrane was thickened and polypoid and in places loosened from the bone. There was some shock immediately after operation which was appropriately treated. On the third day, however, the patient died; autopsy was not obtained. In spite of the result it still appears that the only hope of real relief lay in the establishment of radical drainage. Anything less would have been futile. The prognosis was poor to start with and was recognized as such before operation.

EXTENSIVE OSTEOMYELITIS OF FRONTAL REGIONS. MULTIPLE OPERATIONS—DEATH. Presented by DR. ROSS HALL SKILLERN, Philadelphia.

A boy, aged 16, was operated on for a double hyperplastic ethmoiditis by an intranasal ethmoid exenteration on the right side. Three days later an acute swelling developed over the right ascending maxilla which ruptured and discharged thick yellow pus; the swelling, however, continued across the nose to the left side. The fistula was opened and explored and was found to lead to the frontal sinus. In spite of drainage, a similar abscess pointed on the left side which was found to lead to the left frontal sinus. Later, a septal abscess developed and was opened. Six weeks later, after a stormy convalescence, the boy was sent home with both fistulas draining. On his return after three months, a double, radical, frontal sinus operation was done, after the Lothrop method. Following this, the left fistula healed, the right improved. In two months there was a return of acute swelling over the left sinus which improved under local treatment. Two weeks later at home, the boy developed a sudden left extradural abscess from which he succumbed.

In retrospect, the right infra-orbital swelling should have been opened earlier, thus perhaps avoiding an extension of the low grade osteomyelitis to the other side.

PNEUMONIA FOLLOWING EXTERNAL OPERATION ON FRONTAL SINUS—DEATH. Presented by DR. ROSS HALL SKILLERN, Philadelphia.

A man, aged 28, underwent a modified Lothrop operation for chronic, frontal sinusitis (left). For ten days there was a gradual development of all the symptoms suggestive of a pneumonic consolidation, first in the right and then in the left lung. There was transient improvement following the administration of Huntoon's antibody solution, but death finally occurred on the tenth day.

DISCUSSION

DR. H. P. MOSHER, Boston: I feel that in the first case, with a debilitated patient, an intranasal operation which consumed half as much time would have been a wiser procedure.

In the second case, an osteomyelitis was evidently present, a condition which has been one of my surgical dreads. Under such circumstances I think that it is better not to do an operation or else to do an extremely radical one as soon as possible.

The third case suggests the possibility of death from pneumonia secondary to a postnasal plug, an experience which has occurred to me.

DR. RALPH FENTON, Portland, Ore.: Might not preliminary narcotization with scopolamine and morphine followed by local anesthesia have been a help in these cases? I have been fortunate in the use of local anesthesia in elderly patients, though care must be taken that they do not suffer a cumulative effect, as occurred in one of my cases. The use of transfusions and intramuscular injections of whole blood are of some value in building up a patient's resistance and as a preoperative supporting measure. Until there is a better criteria as to what a patient will stand, courageous operating, even if followed by a fatality, must still be the method of last resort.

DR. WILLIAM MITHOEFER, Cincinnati: A preliminary bacteriologic study should be made previous to any radical operation on the sinus. If *Streptococcus hemolyticus* is recovered, temporary treatment by irrigation with strong mercurochrome-220 soluble in a solution of magnesium sulphate should precede radical operation.

DR. SKILLERN (closing): Huntoon's antibody solution has great value in the treatment of pneumonia, but care must be taken to guard against anaphylaxis by preliminary injections.

THE EVOLUTION OF THE HUMAN FACE: ITS SIGNIFICANCE IN THE FIELDS OF RHINOLOGY AND STOMATOLOGY. Presented by DR. H. H. BRIGGS, Asheville, N. C.

During an indefinite period of time the human body has been undergoing slow but progressive changes in form and structure. Comparative anatomy, paleontology and embryology all indicate that higher forms of life in their development pass through stages represented by permanent forms in lower animals. In addition, the effects of environment and needs of adaptation to it also tend in time to create new forms and species of animal life. Again, natural variations, present in embryo, result in differences and variants.

With regard to the origin of the head or skull, it appears fundamentally, that this structure has evolved from modification of spinal vertebrae. The outstanding characteristic in mammals is the location of the face below instead of in front of the cranium, the cranial portion of the skull becoming larger, the facial portion smaller.

In the development of the brain, there is a gradual migration of the cerebrum until it comes to overlie the cerebellum, thus passing through stages more permanent in lower forms than in man. At the same time there is a forward migration of the eyes from the side to the front with a parallelism of the visual axis resulting in binocular vision. Moreover, there is a change in the axis of the head. In vertebrates, this axis is in line with the vertebral column, but in man the condyles shift forward till the spinal column comes to lie practically under the central cavity of the head.

A further development is the forward tilting of the base of the frontal fossa, until in man it is almost horizontal. This change, together with the recession of the nose and alveolar arches, explains many instances of deviation of the septum, since the latter, caught between two fixed planes, must bend and buckle under the pressure.

The development of the mouth can be seen to pass through many stages representative of adult forms of lower animals. The admission of food as its prime purpose, and the relation of the mouth to the eyes, nose, lips, teeth and tongue all harmonize with this end. In man, the lessened need of preparing all food with the aid of the teeth has led to regressive changes, a smaller alveolar recess and closer, smaller teeth than those seen in lower animals. Likewise, the relative size of the ears has deminished.

The face as a whole has followed the line indicated by all these changes, since it enters into the formation and support of structures concerned with mastication, defense and offense, alimentation, respiration and the sense of smell. As the need for these functions has become modified, so has the form of the face.

DISCUSSION

DR. JOHN M. INGERSOLL, Indianapolis: A study of comparative anatomy in animals, such as the dog, shows a highly developed system of nasal sinuses and turbinals to provide an adequate perception of olfactory stimuli. Associated with this is a cranial cavity which lies posteriorly and does not in any way encroach on the nasal region. In man, there is just the opposite situation. Here the brain has grown forward to overhang the nasal cavities, the turbinates are smaller, the sinuses are smaller and their drainage openings are less advantageously placed. The development of intelligence has been achieved at the expense of the keen olfactory sense of the animals. Thus, I believe that the human nose is in this sense a rudimentary organ which has taken a regressive position as the brain has progressed. This same forward cranial growth explains why the septum is so often deviated in man and never in animals, since it is compressed by the overgrowth of the cranial cavity which pushed down from above.

DR. J. W. JERVEY, Greenville, S. C.: The value to the human economy of the nasal sinuses is still much in doubt and the theories of sounding chambers or air warming cavities have yet to be proved.

SOME NOTES ON THE DIAGNOSIS AND SYMPTOMATOLOGY OF ABSCESS OF THE BRAIN OF OTITIC ORIGIN. Presented by DR. JAMES A. BABBITT, Philadelphia.

Based on the following clinical history, certain facts and features of otitic abscess of the brain will be discussed. A man, aged 35, since an attack of scarlet fever twenty-seven years before presentation had had intermittent aural discharge from the left side and was admitted to the hospital after an illness of three weeks' duration. On arrival he was unable to read or walk, had a slight fever and was suspected of having a disease of the nasal sinus, a condition later disproved by x-ray examination. A faint irregularity of the pupils, sluggishness of the left facial muscles, and general dulness without meningeal signs suggested to the internists either tumor or abscess of the brain. Changes in the fundus were negligible, neurologic observations vague and laboratory data negative with the exception of a spinal fluid count of 1,500, with 66 per cent neutrophils.

As x-ray examination showed a clouding of the left mastoid, a simple operation of the left mastoid was performed, disclosing a marked sclerosis, practically no antrum activity and a normal appearing lateral sinus. Through the mastoid tegumen, a large temporal lobe abscess was reached which yielded 60 cc. of foul pus. After temporary improvement, the patient's condition became worse, and the wound was enlarged and a double drainage tube inserted. A stormy convalescence followed for five days, when a Queckenstedt test of pressure over the jugular veins during lumbar puncture indicated a left sinus thrombosis. The left lateral sinus was opened, and the left jugular vein was ligated. Thrombus was not found but there was evidence of thrombophlebitis. The patient recovered after a prolonged convalescence.

This history brings out, first of all, the obscure etiology and difficulties in diagnosis in abscess of the brain. Chronic otitis media may or may not be significant as a cause but should always be regarded as a suggestion in any one complaining of cerebral symptoms. In the second place, the neurologic observations served chiefly to eliminate anything but a localized condition, and yet even these observations were merely suggestive. In the third place, from an operative point of view, the case illustrates the importance of adequate cerebral drainage. The second operation was required because the drainage provided by the first was insufficient, and it may have been this factor which led to the condition of sinus thrombosis. Intravenous injections of a physiologic solution of sodium chloride and dextrose undoubtedly aided in restoring this patient to health. The case illustrates the extraordinary ability of the human body to withstand not only several prolonged and severe operations but an extended period of severe illness between them with stages of high fever, coma and shock. The residual impairments of any functions were happily slight.

DISCUSSION

DR. THOMAS J. HARRIS, New York: In this case the symptomatology seemed to defy all given rules, and so little help could be obtained from either the neurologist or the ophthalmologist that the surgeon had finally to make the diagnosis and the decision concerning the proper procedure to adopt. Great credit is due to the operator for his decision to open the lateral sinus. The successful outcome of the case indicates the necessity of meeting such complications promptly and still somewhat conservatively.

DR. GEORGE L. RICHARDS, Fall River, Mass.: I should like to recount the case of a girl, aged 12, on whom I operated for a temperosphenoidal abscess complicating a chronic otitis media. Following drainage of the abscess she apparently completely recovered and had no further symptoms for two and a half years, at which time she suddenly developed all the signs of a recurrence and in spite of operation died in twenty-four hours. Latent infection of this sort is one more of the dangers attending such abscesses even in the face of an apparent cure.

DR. SAMUEL J. KOPETZKY, New York: When the symptomatology confuses the picture, a roentgenogram of the ventricle may be of great help. This introduction of air into the lateral ventricles through a needle is not a severe procedure in a comatose patient, and the subsequent x-ray examination may reveal masses, pockets or other abnormalities which may give a valuable clue in obscure cases.

DR. GEORGE W. MACKENZIE, Philadelphia: The picture of abscess of the brain is often complicated by other conditions such as sinus thrombosis or labyrinthine suppuration. A careful examination of the visual fields will often throw light on the location of obscure lesions.

DR. JAMES G. DWYER, New York: Five, of seven patients with abscess of the brain that I have seen, have died. Each had a different symptom-complex, and had to be considered entirely on the individual merits. There is no one set of diagnostic signs in these cases.

DR. E. B. DENCH, New York: As yet, I have been disappointed in the use of the spinal manometer to diagnosticate sinus thrombosis. In three cases of patients with definite clot in the internal jugular vein there was no evidence of it by this test. I have had a patient with cerebellar abscess who lived three years before succumbing to a recurrence.

DR. BABBITT (closing): I believe that the general policy of conservatism followed in this patient's case saved his life.

Book Reviews

DISEASES OF THE EAR, NOSE AND THROAT — MEDICAL AND SURGICAL. By WENDELL C. PHILLIPS, M.D. Seventh edition, revised and enlarged. Pp. 921, with illustrations. Philadelphia: F. A. Davis Company, 1928.

This is a comprehensive volume of 921 pages. The fact that it is in its seventh edition speaks for its popularity. Altogether it is the most comprehensive text on otolaryngology that has so far been prepared by an American author. A profusion of excellent illustrations supplement an excellent text. The work is perhaps the best exposition of the American views on the diseases in this special field. The author has aimed to present a text which is encyclopedic in its scope, and the book is a monument to his industry. It is provided with ample subject as well as author index.

The chapter new to this edition on the problems of hearing is timely. In it are discussed medical-social problems resulting from impairment in hearing. It sets forth in a concise manner that humane work which the organizations for the hard of hearing are doing and which the author was instrumental in creating. Although the text is much too elaborate to serve in toto for the instruction of medical students, it has been used with success for this purpose in many of the leading medical schools by selecting appropriate chapters for this purpose.

The author's nomenclature of tuning forks on page 29 is confusing. The proper designation for the C series of forks is as follows: C_{-2} (16 dv); C_{-1} (32 dv); C (64 dv); c (128 dv); c^1 (256 dv); c^2 (512 dv); c^3 (1024 dv); c^4 (2048 dv) and so forth.

The author in his desire to give the diseases of the ear a fair show places the chapter on otology in the front of the book and devotes 436 pages to this subject, almost half of the entire volume; however, the chapters on the diseases of the nose and throat have not been slighted. Ample attention is paid to the discussion of indications for operative procedures, while the text, as well as the illustrations covering the various operations, is excellent.

Directory of Ophthalmological and Otolaryngological Societies*

NATIONAL

AMERICAN MEDICAL ASSOCIATION, SECTION ON LARYNGOLOGY, OTOLOGY AND RHINOLOGY

Chairman: Dr. William V. Mullin, Cleveland Clinic, Cleveland.
Secretary: Dr. Gabriel Tucker, Bronchoscopic Clinic, University Hospital, Philadelphia.
Place: Portland, Ore. Time: July 8-12, 1929.

AMERICAN BRONCHOSCOPIC SOCIETY

President: Dr. C. J. Imperatori, 17 E. 38th St., New York.
Secretary-Treasurer: Dr. Louis H. Clerf, 128 S. 10th St., Philadelphia.

AMERICAN LARYNGOLOGICAL ASSOCIATION

President: Dr. Bryson Delavan, 40 E. 41st St., New York.
Secretary: Dr. George M. Coates, 1721 Pine St., Philadelphia.
Place: San Francisco. Time: July 4-6, 1929.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. Hill Hastings, 1136 W. 6th St., Los Angeles.
Secretary: Dr. R. L. Loughran, 33 E. 63d St., New York.
Place: San Francisco. Time: July 4-6, 1929.

AMERICAN OTOLOGICAL SOCIETY

President: Dr. J. Gordon Wilson, 104 So. Michigan Ave., Chicago.
Secretary: Dr. Thomas J. Harris, 104 E. 40th St., New York.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY

President: Dr. Luther C. Peter, Physicians Bldg., Philadelphia.
Secretary: Dr. William P. Wherry, Medical Arts Bldg., Omaha.

LOCAL

THE COLORADO OTO-LARYNGOLOGICAL SOCIETY

President: Dr. C. Howard Darrow, Metropolitan Bldg., Denver.
Secretary: Dr. Harold L. Hickey, Imperial Bldg., Denver.
Place: Assembly Room of Metropolitan Bldg. Time: First Saturday of each month from October to May.

SECTION ON OPHTHALMOLOGY AND OTO-LARYNGOLOGY OF THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

Chairman: Dr. Walter A. Wells, 1606, 20th St., N. W., Washington.
Secretary: Dr. J. N. Greear, Jr., 1740 M St., Washington.
Place: 1718 M St., N. W. Time: 8 p. m., third Friday of each month.

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* Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

ATLANTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

President: Dr. Arthur J. Fort, Medical Arts Bldg., Atlanta, Ga.
Secretary: Dr. Leon E. Brawner, 157 Forrest Ave. N. E., Atlanta, Ga.
Place: Academy of Medicine, 38 Prescott St. N. E. Time: 8 p. m., last Thursday of each month.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. Arthur M. Corwin, 25 E. Washington St., Chicago.
Secretary: Dr. Austin A. Hayden, 25 E. Washington St., Chicago.
Place: Grill Room, Stevens Restaurant, 16 N. Wabash Ave. Time: 6 p. m., first Monday of each month from October to May.

INDIANAPOLIS OPHTHALMOLOGICAL AND OTO-LARYNGOLOGICAL SOCIETY

President: Dr. Lafayette Page, Hume-Mansur Bldg., Indianapolis.
Secretary: Dr. Kenneth L. Craft, Hume-Mansur Bldg., Indianapolis.
Place: University Club. Time: 6:30 p. m., second Thursday of each month from October to May.

NEW ORLEANS OPHTHALMOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. J. Raymond Hume, Maison Blanche Bldg., New Orleans.
Secretary-Treasurer: Dr. W. A. Wagner, Pere Marquette Bldg., New Orleans.
Place: Eye, Ear, Nose and Throat Hospital, New Orleans.
Time: 8 p. m., third Thursday of each month from September to June.

SECTION ON OTOLOGY AND LARYNGOLOGY OF THE BALTIMORE CITY MEDICAL SOCIETY

Chairman: Dr. Waitman F. Zinn, Medical Arts Bldg., Baltimore.
Secretary: Dr. Moses L. Breitstein, 1212 Eutaw Pl., Baltimore.
Place: 1211 Cathedral St. Time: 8:30 p. m., last Friday of each month.

DETROIT OTO-LARYNGOLOGICAL SOCIETY

President: Dr. William Fowler, 1048 Maccabees Bldg., Detroit.
Secretary-Treasurer: Dr. Don A. Cohoe, 13535 Woodward Ave., Detroit.
Place: Maccabees Bldg. Time: Third Wednesday evening of each month from October to May.

THE KANSAS CITY EYE, EAR, NOSE AND THROAT SOCIETY

President: T. S. Blakesley, Lathrop Bldg., Kansas City, Mo.
Secretary: Dr. A. E. Eubank, Argyle Bldg., Kansas City, Mo.
Time: Third Thursday of each month from September to May; the November, January and March meetings are devoted to clinical work.

NEW ENGLAND OTOLOGICAL AND LARYNGOLOGICAL SOCIETY

President: Dr. Francis P. Emerson, 520 Commonwealth Ave., Boston.
Secretary-Treasurer: Dr. Charles T. Porter, 520 Commonwealth Ave., Boston.

ACADEMY OF MEDICINE OF NORTHERN NEW JERSEY SECTION ON EYE, EAR, NOSE AND THROAT

Chairman: Dr. Lee W. Hughes, 1019 Broad St., Newark.
Secretary: Dr. Earle LeRoy Wood, 31 Lincoln Park, Newark.
Place: 91 Lincoln Park, South. Time: 8:45 p. m., second Monday of each month.

THE SECTION OF LARYNGOLOGY AND RHINOLOGY OF THE NEW YORK ACADEMY OF MEDICINE

Chairman: Dr. David H. Jones, 114 E. 54th St., New York.
Secretary: Dr. Edward Frankel, Jr., 152 W. 58th St., New York.
Place: 103d St. and Fifth Ave.
Time: 8:30 p. m., fourth Wednesday of each month from October to May.

THE OTOLOGICAL SECTION OF THE NEW YORK ACADEMY OF MEDICINE

Chairman: Dr. Clarence H. Smith, 2 E. 54th St., New York.
Secretary: Dr. James Garfield Dwyer, 57 W. 57th St., New York.
Place: 103d St. and Fifth Ave. Time: Second Friday of each month from October to May.

EASTERN NEW YORK EYE, EAR, NOSE AND THROAT ASSOCIATION

President: Dr. J. Ivimey Dowling, 116 Washington Ave., Albany, N. Y.
Secretary-Treasurer: Dr. L. Prescott Brown, 33 Bancker St., Albany, N. Y.

CINCINNATI OTO-LARYNGOLOGICAL SOCIETY

President: Dr. C. C. Jones, Doctors Bldg., Cincinnati.
President-Elect: Dr. Harris H. Vail, 24 E. 8th St., Cincinnati.
Secretary-Treasurer: Dr. M. F. McCarthy, 2600 Union Central Bldg., Cincinnati.
Place: University Club. Time: 6:45 p. m., second Tuesday of each month from October to May.

THE OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SECTION OF THE CLEVELAND ACADEMY OF MEDICINE

Chairman: Dr. A. B. Brunner, Guardian Bldg., Cleveland.
Secretary: Dr. A. L. Stotter, 1148 Euclid Ave., Cleveland.
Place: Winton Hotel. Time: Fourth Friday of each month.

PACIFIC COAST OTO-OPHTHALMOLOGICAL SOCIETY

President: Dr. Robert R. Hampton, Boston Bldg., Salt Lake City.
Secretary-Treasurer: Dr. Walter F. Hoffman, 817 Summit Ave., Seattle.
Place: Santa Barbara, Calif. Time: April 18-20, 1928.

PHILADELPHIA LARYNGOLOGICAL SOCIETY

President: Dr. Ralph Butler, 2007 Chestnut St., Philadelphia.
Secretary: Dr. Herman B. Cohen, 13th & Spruce Sts., Philadelphia.
Place: College of Physicians. Time: 8:30 p. m., first Tuesday of each month from October to June.

THE SECTION ON OTOLOGY AND LARYNGOLOGY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

Chairman: Dr. James A. Babbit, 1912 Spruce St., Philadelphia.
Clerk: Dr. Curtis C. Eves, 1910 Spruce St., Philadelphia.
Place: College of Physicians. Time: 8:30 p. m., third Wednesday of each month from October to June.

THE MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY

Chairman: Each member, in alphabetical order.
Secretary: Dr. R. O. Rychener, Exchange Bldg., Memphis.
Place: Eye Clinic of Memphis Eye, Ear, Nose and Throat Hospital. Time: 8 p. m., second Tuesday of each month.

DALLAS ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

President: Dr. John G. McLaurin, Medical Arts Bldg., Dallas.
Executive Secretary: Dr. W. Mood Knowles, Medical Arts Bldg., Dallas.
Recording Secretary: Dr. L. M. Sellers, Medical Arts Bldg., Dallas.
Place: Dallas Athletic Club. Time: 6 p. m., first Tuesday of each month from October to June. The November, January and March meetings are devoted to clinical work.

FORT WORTH EYE, EAR, NOSE AND THROAT SOCIETY

President: Dr. H. L. Warwick, Medical Arts Bldg., Fort Worth.
Secretary: Dr. A. E. Jackson, Medical Arts Bldg., Fort Worth.
Place: University Club. Time: 6 p. m., first Friday of each month except August.

EYE, EAR NOSE AND THROAT SECTION OF THE HOUSTON ACADEMY OF MEDICINE

President: Dr. S. T. Pullium, Medical Arts Bldg., Houston.
Secretary: Dr. R. M. Hargrave, Esperson Bldg., Houston.
Place: Medical Arts Bldg., Harris County Medical Society Rooms. Time: 8 p. m., first Thursday of the mouth from September to June.

THE MILWAUKEE OTO-OPHTHALMIC SOCIETY

President: Dr. L. P. Allen, 145½ Main St., Oshkosh, Wis.
Secretary-Treasurer: Dr. Edward R. Ryan, 425 E. Water St., Milwaukee.
Place: University Club. Time: 6:30 p. m., third Tuesday of each month.